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Daylight saving and standard time for the U.S.

Washington

1917

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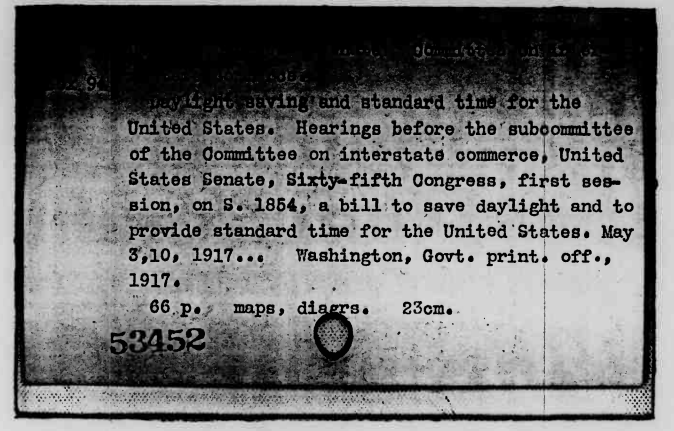
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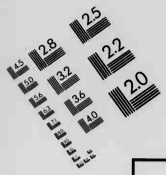
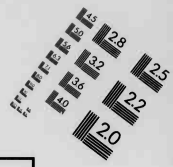
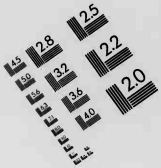
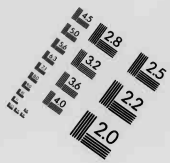

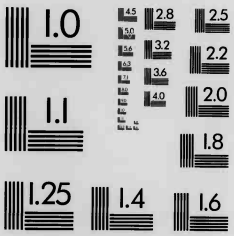

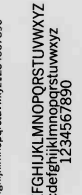
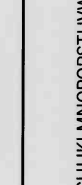

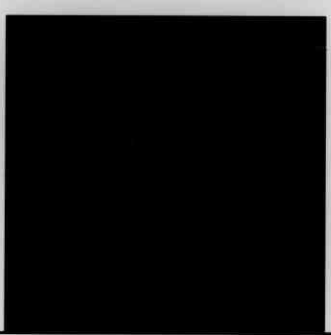
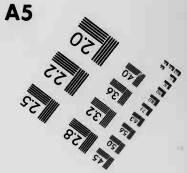
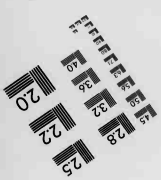
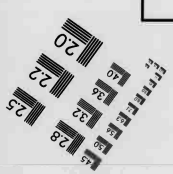
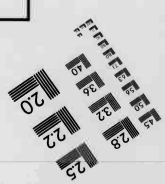

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DAYLIGHT SAVING AND STANDARD TIME FOR THE UNITED STATES

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HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE COMMITTEE ON INTERSTATE COMMERCE UNITED STATES SENATE

SIXTY-FIFTH CONGRESS

FIRST SESSION

ON

S. 1854

A BILL TO SAVE DAYLIGHT AND TO PROVIDE STANDARD TIME FOR THE UNITED STATES

MAY 3, 10, 1917

Printed for the use of the Committee on Interstate Commerce

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

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DAYLIGHT SAVING AND STANDARD TIME FOR THE UNITED STATES.

THURSDAY, MAY 3, 1917.

UNITED STATES SENATE,
COMMITTEE ON INTERSTATE COMMERCE,
Washington, D. C.

The subcommittee met, pursuant to call, at 10 o'clock a. m., in the committee room, Capitol, Senator Joseph T. Robinson presiding.

Present: Senators Kellogg and Saulsbury.

Senator Calder was also present.

The CHAIRMAN. The committee will come to order. The hearings this morning are upon the bill S. 1854, introduced by Senator Calder, which is entitled a bill to save daylight and to provide standard time for the United States, as follows:

S. 1854. A BILL To save daylight and to provide standard time for the United States.

Be it enacted, etc., That, for the purpose of establishing the standard time of the United States, the territory of continental United States shall be divided into five zones in the manner hereinafter provided. The standard time of the first zone shall be based on the mean astronomical time of the seventy-fifth degree of longitude west from Greenwich; that of the second zone on the ninetieth degree; that of the third zone on the one hundred and fifth degree; that of the fourth zone on the one hundred and twentieth degree; and that of the fifth zone, which shall include only Alaska, on the one hundred and fiftieth degree. That the limits of each zone shall be defined by an order of the Interstate Commerce Commission, having regard for the convenience of commerce and the existing junction points and division points of common carriers engaged in commerce between the several States and with foreign nations, and such order may be modified from time to time.

SEC. 2. That within the respective zones created under the authority hereof the standard time of the zone shall govern the movement of all common carriers engaged in commerce between the several States or between a State and any of the Territories of the United States, or between a State or the Territory of Alaska and any of the insular possessions of the United States or any foreign country. In all statutes, orders, rules, and regulations relating to the time of performance of any act by any officer or department of the United States, whether in the legislative, executive, or judicial branches of the Government, or relating to the time within which any rights shall accrue or determine, or within which any act shall or shall not be performed by any person subject to the jurisdiction of the United States, it shall be understood and intended that the time shall be the United States standard time of the zone within which the act is to be performed.

SEC. 3. That at two o'clock antemeridian of the last Sunday in April of each year the standard time of each zone shall be advanced one hour, and at two o'clock antemeridian of the last Sunday in September in each year the standard time of each zone shall, by the retarding of one hour, be returned to the mean astronomical time of the degree of longitude governing said zone, so that between the last Sunday in April at two o'clock antemeridian and the last Sunday in September at two o'clock antemeridian in each year the standard time in each zone shall be one hour in advance of the mean astronomical time of the degree of longitude governing each zone, respectively.

SEC. 4. That the standard time of the first zone shall be known and designated as United States standard eastern time; that of the second zone shall be known and

designated as United States standard central time; that of the third zone shall be known and designated as United States standard mountain time; that of the fourth zone shall be known and designated as United States standard Pacific time; and that of the fifth zone shall be known and designated as United States standard Alaska time.

SEC. 5. That all acts and parts of acts in conflict herewith are hereby repealed.

The CHAIRMAN. A number of gentlemen are present and desire to be heard. Do you wish to address the committee, Senator Calder?

Senator CALDER. Yes, Mr. Chairman.

This bill was introduced by me at the suggestion of a great many prominent business men of the United States. They believe that just at this time it would be in the interest of the best possible administration of affairs in this Nation to have another hour in the daylight part of the day rather than in the morning, when people are usually asleep.

This measure is strongly advocated by the Chamber of Commerce of the United States; by a great many boards of trade and chambers of commerce throughout the country; by the American Federation of Labor; and by the advisory committee of the National Defense Council, whose offices are here. It is also favored by the President of the United States.

Senator KELLOGG. Who is the national committee of the National Defense Council?

Senator CALDER. Mr. Rosenwald informs me that the council itself has not passed the resolution, but the advisory committee has. Also this measure is advocated by a great many men throughout the Nation. It has been suggested that the only people who would possibly oppose it are the people who are interested in the lighting business and in the heating business.

Most of the countries in Europe involved in the present conflict have enacted legislation dealing with this subject in the past two years. Gentlemen who are present here who are more familiar with the details than I am will present the case to you, and if you have no objection we will now present Mr. Matthew Marks, president of the Borough of Manhattan, New York City, and also president of the National Association of Daylight Saving, also president of the New York Daylight Saving Association.

The CHAIRMAN. The committee will be glad to hear Mr. Marks.

STATEMENT OF MR. MATTHEW M. MARKS, NEW YORK CITY.

Mr. MARKS. Mr. Chairman and gentlemen: We have had during the last year a great many hearings in order to get the general sentiment, and in every case there has been a unanimous sentiment in favor of it, and a few months ago we had a national convention in New York, attended by representatives from all over the United States, labor unions, commercial bodies, and legislators present, and here again they expressed unanimous sentiment in favor of this measure. Over 1,000 attended one of our meetings, representing all the interests in the country.

Mr. Gompers wrote us pledging the American Federation of Labor in the interest of the working people.

The CHAIRMAN. Very well, tell us what the measure will accomplish.

Mr. MARKS. First, I want briefly to give the indorsements.

The CHAIRMAN. We will waive that. I want to say this to you, that is not a very material consideration. We want to know about the merits of the measure. We understand how propagandas are carried on. I get telegrams here about a great many subjects that are uniform, and I know they are all from one source. We should like to have you tell us about the merits.

Mr. MARKS. All I shall quote are large associations of business men of the United States.

The CHAIRMAN. You can put that in the record.

Mr. MARKS. The purpose that brings us here at this time, primarily, is President Wilson's message that the food supply needs increase. If we can have this daylight saving enacted, for instance, as far as New York City is concerned, there are a million people come into New York, Manhattan, every day and go back to their homes every night; they will get there one hour earlier and they will have one hour more of daylight for gardening. Multiply that by the other cities in the United States and the stimulation of gardening is tremendous.

Twelve European countries adopted this, and every one of them gives us a satisfactory report and say it will be a permanent institution even after the war is over on account of, first, increase in production; in the second place, conservation of health; and in the third place the saving in gas and the consequent saving in fuel. In London they figure that 200,000 tons of coal was saved on account of this hour of daylight being enacted, the people going to bed an hour earlier.

You might say anyone can do it without any legislation. We have as an instance, Mr. Colgate, who employs in his factory 5,000 people. He will give you his statement as to how much they gained by it, but you can not do it except in an isolated community like his without falling out with your neighbors.

We want no time-tables changed, only the clock changed; no engagements changed, only the clock changed. And it is not anything mandatory you are doing; you are doing this to help the country's material advance. There is no penalty attached in the bill; they may leave their clocks unchanged if they wish.

The return in gardening, the fuel saving, and the general health improvement—those are the three main arguments. I have set forth these points in a brief I have here.

The CHAIRMAN. We shall be glad to have you leave that for the record.

Mr. MARKS. I will leave that for the record so as not to take up your time further. The workers of the country are going to be the greatest beneficiaries, and as an emergency measure you do not need to look to any precedents. There have been no precedents for this war.

(The brief referred to by Mr. Marks is here printed in full, as follows:)

BRIEF OF MARCUS I. MARKS, PRESIDENT NATIONAL DAYLIGHT SAVING ASSOCIATION, PRESENTED AT HEARING ON "DAYLIGHT SAVING" BILL BEFORE SENATE INTERSTATE COMMERCE COMMITTEE.

The "daylight saving" plan, namely, turning the clock forward an hour during the summer months, was first adopted by Germany as a war measure in the spring of 1916. Thereafter it was put into effect in England, France, Germany, Austria-Hungary,

Italy, Sweden, Denmark, Norway, and Holland. In addition to these countries this year, Portugal, Australia, Iceland, and Bermuda have adopted it. In 1916 the Province of New Brunswick, Canada, adopted it, and also many cities throughout Canada.

During 1916 the plan was practically on trial and the British Parliament, German Reichstag, and the legislative body of Holland appointed committees to investigate the results of the plan. Each of these committees, after a long and careful study of the effects and results thereof, recommended that the plan be again put into effect this year and made permanent.

Among the advantages and benefits gained by the enactment of the plan, the reports show the following:

General benefit to public health, it being universally found that the extra hour of daylight in the late afternoon was generally used for the purpose of outdoor recreation and pursuits and, in particular, for the cultivation of gardens.

In the industrial districts in England it was found, for example, that the extra hour of light was a great boom to athletic clubs.

That the open-air swimming pools were used much more extensively in the evening than previously and that in the gardening classes for boys and girls the extension of daylight was a great advantage and the committee was enabled to continue the meetings of these classes a month longer than in previous years.

The general effect on the public morals and order was good. Ten general tendency throughout the country to spend the extra hour of daylight in the afternoon out of doors is said to have made for an improvement in the general moral tone. In particular, a marked decrease was noticed in juvenile offenses.

THE EFFECT ON WORKERS' INTERESTS.

Nine out of fourteen trade-unions of England reported favorably. Social settlements stated that the plan was widely appreciated by working class families. The mothers' meetings more than doubled in attendance and one worker said: "In the height of the summer it was as though a Saturday afternoon holiday had been added to each day."

The manager of one of the most important manufacturing concerns in England called the summer-time act "One of the greatest booms conferred on the industrial classes of the greater towns by recent legislation."

EFFECT UPON TRADE, INDUSTRY, AND COMMERCE.

The English committee's report shows that the opinion of employers in every trade, industry, and business throughout the country was overwhelmingly in favor of summer time.

INCREASED FOOD PRODUCTION.

As stated before, the extra hour of daylight in the afternoon was universally used by all, including a large number of workers for the cultivation of gardens and allotments.

ECONOMIES IN ARTIFICIAL LIGHT AND FUEL.

Reports of the various investigating committees show that there was a substantial economy in artificial light and in coal consumption. The exact saving was almost impossible to compute, owing to the unusual conditions existing during the war. The various electric lighting companies of England reporting to the committee showed an average deduction of 23 per cent in amount of light consumed.

The estimated saving in gas amounted to about 9 per cent.

The estimated saving in coal consumption throughout the United Kingdom is 260,000 tons. There was also a considerable saving in the quantity of illuminating oil.

DISADVANTAGE.

One disadvantage which the British committee called attention to was the difference in time between the London Stock Exchange and the New York Stock Exchange. By advancing the clock one hour throughout England, the one hour of the day in which formerly both exchanges were open at the same time was eliminated and on that account much business was lost. For this reason it would be a great advantage to members of the New York Stock Exchange if the United States adopted "daylight saving," thus restoring the one hour during the day in which exchanges can do business with one another.

INDORSEMENTS IN THE UNITED STATES.

Early in May, 1916, the New York Daylight Saving Committee, composed of 200 representative business men and women, indorsed the plan for the United States. Thereafter, at its suggestion, the Merchants' Association of New York City also indorsed the plan. Through our committee the matter was brought to the United States Chamber of Commerce, and a special daylight saving committee was appointed, which reported in favor of the bill, and that chamber on February 1, 1917, also indorsed the plan. Over 100 of the leading chambers of commerce and boards of trade throughout the country favor it. Among the more prominent of these are the Chamber of Commerce of Pittsburgh, Pa., Boston, Detroit, Kansas City, St. Louis, Rochester, Cleveland, San Diego, Minneapolis, Los Angeles, and Denver. The advisory commission of the National Council of Defense has recommended the plan unanimously. It has the official approval of the American Federation of Labor, the National Lawn Tennis Association, leaders of the National Base Ball League, golf association, automobile, rowing, and other national organizations.

It has also received the indorsement of thousands of individuals throughout the country, including a number of railroad presidents, such as Daniel E. Willard, Frederic Underwood, and Frank Trumbull.

It has been supported editorially by over 150 of the leading daily newspapers, including the New York Globe, New York Tribune, New York Evening Mail, New York Evening Post, Christian Science Monitor of Boston, New York Evening Journal, Syracuse Post Standard, Chicago Record-Herald, Denver Commercial, Jersey City Journal, Kansas City Star, Newark News, Omaha Bee, Providence Journal, Pittsburgh Post, St. Louis Post-Dispatch, Globe Democrat, Washington Post, Times, Herald, and Star.

Finally, it has received the indorsement of President Wilson himself:

THE WHITE HOUSE,
Washington, January 30, 1917.

MY DEAR MR. MARKS: I would have been glad to back up any movement which has the objects of the daylight saving movement.

In haste.

Cordially and sincerely, yours,

WOODROW WILSON.

Hon. MARCUS M. MARKS,
Chairman New York Daylight Saving Committee,
New York City.

The CHAIRMAN. As a matter of fact, there is no precedent in the laws of the United States, is there?

Mr. MARKS. No; nor in the foreign countries.

The CHAIRMAN. There is a precedent now in the foreign countries?

Mr. MARKS. Now there is, yes. They had no precedent before, however.

The CHAIRMAN. The idea is to move the clock forward an hour?

Mr. MARKS. Yes, sir; all over the country during the summer months.

The CHAIRMAN. And thus make the day begin earlier and end earlier?

Mr. MARKS. Yes, sir; without any psychological damage. It is psychology; you look at your clock; you are used to getting out at a certain time and you can not do it any other way.

Senator KELLOGG. Do you make certain zones?

Mr. MARKS. We leave the zones as they are.

Senator KELLOGG. Fixing the difference of time, say, between New York and Chicago, or whatever the zone is, Chicago and Denver, and so on, but moving by law the clock forward one hour?

Mr. MARKS. There is no change contemplated in the zones by this action, no change whatever. It is the simplest thing in the world.

The CHAIRMAN. You conform to the subdivisions already existing?

Mr. MARKS. Yes.

The CHAIRMAN. You simply change the clock?

Mr. MARKS. We simply change the clock all around and there is no relative difference whatever. You do not change anything but your clock.

Senator CALDER. We will next present Prof. Harold Jacoby.

STATEMENT OF PROF. HAROLD JACOBY, RUTHERFORD PROFESSOR OF ASTRONOMY, AND MEMBER OF EXECUTIVE COMMITTEE NATIONAL DAYLIGHT SAVINGS ASSOCIATION, COLUMBIA UNIVERSITY.

Prof. JACOBY. Mr. Chairman and gentlemen, stating in the briefest possible way, and to clear up the point raised by Senator Robinson just now, Chicago under the new arrangement, will use eastern time in summer and central time in winter. The words, "eastern and central time" will mean in the future exactly what they now mean.

Senator KELLOGG. The time will be the same as now in winter?

Prof. JACOBY. The time in winter will be the same as now, and in summer, instead of using the time they now use, they will use eastern time instead of central time, and that will be an hour later.

It requires almost no time to explain the purpose of this movement. In summer the sun rises earlier than it does in winter. The period of sunlight is appropriate for work; the period of darkness is the period appropriate for sleep, and the time of year when the sun rises earlier it is logical and sensible to get up earlier. Many people do it now. We simply have a device to enable everybody to do it without inconvenience.

We think that this can be put into the laws of the United States under the provisions of the Constitution, which gives Congress power and makes it its duty to coin money, regulate the value thereof, and of foreign coin, and fix the standards of weights and measures. This is a standard for the measurement of time, and under the power of the Constitution we feel that Congress can act, and we feel morally certain that no one will by a suit attack any act that might be passed in this way.

The most important detail to add to this is that the railroads, with whom the matter of time is most important, will not be required by this change to do anything whatever. A train like the Empire State Express, which leaves New York at 8 o'clock now, will always leave New York at 8 o'clock as it now does. No number need be changed in any time-table at all.

The CHAIRMAN. As a matter of fact, will it not leave an hour earlier?

Prof. JACOBY. Of couse it will in summer, but it will leave at 8 o'clock by the clock; therefore, since people take their time from the clock, it will leave at the same time as far as they are concerned.

Now, this plan is not without ingenuity. It looks like making something out of nothing, and when we advocated this plan several years ago it was just as good then as it is now, but it seemed like an academic question, and I, who live in an academy, know that an academic question will never receive consideration.

But here we have an emergency. Why, gentlemen, if we can get the clocks moved forward an hour to-morrow we may be able by the end of this summer to produce, and through that alone, an appreciable impression on this war question. We feel now that that

which before was desirable has become infinitely desirable, and instead of being an academic question it is a thing which 10 or 12 nations of Europe have put into effect, and after using it a year, have decided to continue.

Senator KELLOGG. Have all the nations of western Europe got it?

Prof. JACOBY. Yes, sir.

Senator KELLOGG. Great Britain and France?

Prof. JACOBY. Great Britain, France, and Germany; and Germany was the first.

Mr. MARKS. Eleven countries, England, France, Germany, Austria-Hungary, Italy, Sweden, Denmark, Norway, and Holland. In addition to these countries, this year, Portugal, Australia, Iceland, and Bermuda have adopted it.

Prof. JACOBY. Germany was first and England followed soon.

Senator KELLOGG. Let me ask you this other question. Do you place the validity of this act on the provision of the Constitution authorizing Congress to fix a standard of measures to govern time as well as everything else? This bill also might possibly be sustained as to one provision of it as to regulating the time of interstate carriers, might it not?

Prof. JACOBY. Yes, sir.

Senator KELLOGG. Assume that it was valid as a regulation of interstate carriers, and invalid as to where it undertook to fix certain other rules of time, would it be effective if it went into effect for that purpose, would it be accepted by everybody, do you think?

Prof. JACOBY. I think so.

Senator KELLOGG. Even if it was simply valid as to interstate carriers, it would become effective?

Prof. JACOBY. I am sure it would, because I was in the game when standard time was introduced in the early eighties. I was then assistant to the president of Columbia College, and there was no legislation needed after the railroads accepted it at that time.

I wish to say that I am not here to pass on legal questions involved, but as one to certify that there exists no scientific reasons, no reason known to astronomers why this should not be put into effect.

The CHAIRMAN. Mr. Robert Garland is present and we shall be glad to hear from him.

STATEMENT OF MR. ROBERT GARLAND, CHAIRMAN DAYLIGHT SAVINGS COMMITTEE, UNITED STATES CHAMBER OF COMMERCE, AND PRESIDENT CHAMBER OF COMMERCE, PITTSBURGH, PA.

Mr. GARLAND. Mr. Chairman and gentlemen, I represent the Pittsburgh Chamber of Commerce as its president, with over 3,000 members, and also appear as chairman of the daylight saving committee of the United States Chamber of Commerce. That organization has over 800 constituent members, such as chambers of commerce and boards of trade throughout the country in all the important cities of the country, in every section of the country, in every State, representing over 450,000 members.

We have acted favorably on this question, our committee having presented a report. Some of the members of the committee are here. It was passed unanimously by that body, meaning that the

manufacturers mercantile houses and business establishments throughout the country, real estate interests, banking interests and others that you might call general business interests, are in favor of the proposition.

When we passed upon this question a few months ago it did not seem to me to be so urgent as it does now. As Prof. Jacoby has said, we are "slaves of the clock."

The Senator asked the question, "Would it not be an hour earlier?" It is like this. The man who leaves his house at 8 o'clock in the morning will still leave at 8 by the clock, but at 7 sun time, but when the man goes home at 5 o'clock in the afternoon by the clock, he will be going home at 4 o'clock sun time, and those people, shop girls, clerks, and others who work until 6 o'clock throughout the country will be going home at 5 o'clock sun time, but it will still be 6 o'clock by the clock. We just fool ourselves by changing our clocks uniformly in all the time zones in the country, so one hour is saved of daylight.

The ancient Romans had it down more simple than we have. They saved it. They had their 24 hours during certain months, also 20 hours and 18 hours, according to the sunrise. But the practical thing that impresses me, and should impress every American to-day, is the fact that this one hour which is conserved of daylight can be used to advantage either in military training or in farm gardening. The slogan to-day is "Back to the farm in large units," and in industrial districts, such as I come from, Pittsburgh, it is back to the "vegetable garden" and the "back yard lot." And that is common all over the country to-day.

So the point I present before you particularly is this, that it would be a great boon to the American people to get this extra hour at this time. I believe if it goes into effect as a war measure that it will continue along in times of peace.

We presented in our report statistics from the different countries. Ten European countries have adopted it, practically every great country except Russia, and Australia has adopted it within the last five or six weeks. It is a matter that should be given very quick and earnest consideration, because this extra hour not only means economy in the use of electric light and other illuminants, but it means physical recreation for our people, for the men, women, and children of the country, and it means more gardening.

We must recollect that probably 40,000,000 men are engaged in the war, the great majority of them taken from agricultural pursuits; stores and stocks have been depleted both here and in Europe, and it becomes incumbent upon us to take care of ourselves and to help those starving people on the other side. This one hour can be used to considerable advantage in gardening, and to-day we lay particular stress on that one hour for farm-gardening purposes.

I believe, also, Senators, that if you will ascertain from the British or the French commissions, from any of the members who are here, they will say that they not only are satisfied to have this in time of war, but they will also continue it in times of peace. Those are the verdicts we get from these various countries, and we have corresponded with chambers of commerce in Great Britain; we have statistics and reports from the main cities, such as London, Birmingham, Manchester, Glasgow, and other cities, as well as Belfast, in

Ireland. We have reports from Vienna; we have reports from Berlin; we have reports from Paris. In England alone, in the short term of five and one-half months, they saved in fuel $12,000,000 in our money, and in France $10,000,000. It means economy, it means efficiency, it means physical recreation for our people, and it means farm gardening to a very much larger extent than we have to-day, because it gives the men, women, and children that extra hour, and that is the one thing I wish to impress upon you.

We are not particular as to the number of months it is made effective. In the European countries they have taken five, five and a half, and six months. Some people over here ask for eight months. Some say make it 12 months and do not turn back the clock in the fall. We are not concerned as to that. What we want to do is to get it for the summer term particularly. The chamber of commerce in its wisdom, as I say, representing over 450,000 business houses, and business men throughout the country passed a resolution which I will leave here as an exhibit asking for not less than five months in each year.

The CHAIRMAN. That is what the bill provides.

Mr. GARLAND. Yes; that is the bill, and I should like to leave the report of the Chamber of Commerce of the United States, and should like to have it go into this record as an exhibit the report of the committee on daylight saving, and the resolution passed by the chamber.

The CHAIRMAN. That may be included in the record.

(The documents referred to are here printed in full, as follows:)

[Fifth annual meeting. Washington, Jan. 31 and Feb. 1 and 2, 1917.]

REPORT OF COMMITTEE ON DAYLIGHT SAVING OF THE CHAMBER OF COMMERCE OF THE UNITED STATES.

To the board of directors of the Chamber of Commerce of the United States:

Definition.—The daylight hours can be "saved"—i. e., utilized to the best advantage—only by readjusting the hours of work and recreation to which most of the community have become accustomed and by making the readjustment in such a way that these hours will contain a maximum of sunlight. There is no suggestion that the hours of work be either lengthened or shortened.

Workday and daylight.—The hours of our daily life have become somewhat out of keeping with the hours of daylight and we have sacrificed the sunlight which might be utilized for recreation and other leisure activities at the end of the workday. In ancient times, and even within rather recent times, the workday generally began much earlier than at present, and the evening meal usually came at an hour of daylight throughout the year. Development of improved illuminants probably had its part in changing our habits; at present we sleep through many hours of daylight in the morning, begin our conscious day late according to sun time, and during a good part of the year have our evening meal and our period of recreation and leisure after nightfall. In effect we throw away daylight and substitute for it artificial heat and light which are but inferior derivatives of the sunlight we thoughtlessly discard.

Daylight as now used.—The amount of daylight which we do not now utilize can not be precisely stated, because the hours of daylight not only vary with the seasons but they differ by as much as an hour in the same day in the northern part of the country and the southern, and they lengthen as altitude above sea level increases. Whatever the part of the country, however, the morning work period begins so late that the work period which follows luncheon can not have as much sunlight as occurs before noon, and in many cases ends in darkness during an important part of the year.

Daylight at Chicago.—The manner in which we now utilize these hours of daylight may be illustrated by the situation in Chicago. Throughout the year at Chicago the time between sunrise and noon—when the workday is most commonly broken—is longer than between 1 p. m., when the second work period ordinarily begins, and sunset. In December there are almost five hours of sunlight before noon and less than three and a half hours after 1 p. m. In June there are approximately eight hours before noon and about six and a half after 1 p. m.

Manner of waste.—The significance of these facts appears when we recall that, in midsummer, if the workday begins at 8 a. m. and ends at 5 p m., almost five hours of sunlight have passed before the workday begins and but two and a half remain after its close. Thus, four hours of sunlight are used in the morning for sleep and for the "transition from bed to street." The period at the end of the day, with its great value for development of human efficiency, encouragement of human intercourse, and improvement of social relations, falls partly under artificial light even in the most favorable season of the year, and at other seasons comes altogether after nightfall. If the workday ends at 6, the results are still more undesirable, as subsequent hours of daylight are shortened, and, moreover, in a portion of the year the end of the workday, when workers in all occupations are most weary and most need favorable conditions, is reached under artificial light.

Business with Europe.—Our workday has not only taken such a position that it deprives us of sunlight in a part of the day which has great importance for human efficiency, but it also interferes in our business relations with Europe, the part of the world with which we have our closest relations. Our present arrangement of time, based since 1883 upon "standard" time (see Appendix B for standard time), with an hour of difference for each zone of 15° of longitude, assigns zones and hours to the barren expanse of the Atlantic Ocean, where they are of no practical utility.

Undoubtedly, the result is to keep the clocks in each zone in the United States at least within half an hour of the time which a sundial would show, but the result likewise is that business offices in the eastern part of the United States open at a time when it is 2 o'clock in the business day of London banks and exchanges. When it is 9 o'clock in the morning at New York and Philadelphia it is within six minutes of 3 o'clock in Berlin and 4 o'clock in Petrograd. In Chicago the difference in time with these European centers is one hour greater.

As European countries generally moved the clock forward an hour during the past summer, and will probably do likewise next summer, the difference between the business day in Europe and in the United States will be further accentuated unless action is taken in the United States. It would seem an anachronism that, although we have devised means for instantaneous communication with Europe, we should continue to have our business day so much later than the European business day as to impede our financial and commercial transactions, especially at a time when our relations with Europe have taken on greatly enlarged importance.

Committee's recommendation.—With these circumstances in mind, the committee recommends that clocks in the United States should be set one hour ahead of the present "standard" time.

Improved working conditions.—The considerations supporting this proposal are physiological, economic, and social. It will substitute a cool morning working hour in summer for a warm afternoon hour; in winter it may place breakfast before sunrise but it will bring a greater amount of daylight into the working hours at the end of the day. The accompanying improvements in working conditions will be great. Increased daylight in the hours of greatest fatigue will tend to lessen tuberculosis, will decidedly reduce eye strain, will increase personal efficiency, and will materially lessen industrial accidents. In cities the advantage of having the evening "rush" hour, when transportation facilities are taxed, come in daylight is so apparent it scarcely needs statement.

Recreation.—Hours of sunlight after the end of the workday will confer even greater benefits. Responding to a public demand which has practically become a national policy, facilities for healthful outdoor recreation have on every hand been multiplied for all classes. In 1915 American cities spent $21,000,000 to maintain their activities in promoting recreation. For this purpose New York used 70 cents per capita of its population, Chicago $1.20, and Boston $1.84. Although perhaps not yet keeping pace with Europe, our cities have invested large sums in land for parks. The significance of the purpose of such investments may be indicated by estimates which declare that in less than 20 years Central Park in New York City added $183,000,000 to the value of land in its vicinity. Counties and other local districts, as in Massachusetts and New Jersey, have undertaken to provide attractive places for outdoor recreation. A number of States have done likewise, and finally the Federal Government, selecting tracts of most uncommon scenic beauty, dedicated more than 7,000 square miles to public recreation. An additional hour of daylight will not enable any one individual to make use of all these facilities for his healthful pleasure, but it will give him increased opportunity for greater use of those nearest at hand. The use of facilities for recreation, especially by the classes that work longest hours and most need them, would be tremendously increased, with results in health and physical stamina which would redound to the advantage of the whole community. There would be great benefits, too, from the increased opportunities for use of means of education, direct and indirect, which in recent years have been greatly augmented for the period after the workday has closed.

Social benefits.—The social life of the Nation, too, would benefit. The hours for companionship among members of families would have greater value, and there would be more opportunity for cultivation of all the useful and desirable activities and interests which engage our attention outside our vocations.

Economic advantages.—From such benefits as these economic advantages inevitably flow. Improved physical health and social welfare will increase the efficiency of every individual at his daily tasks. Furthermore, ther would bee large direct savings in expenditures for fuel and artificial light.

Continuous industries.—In the advantages which have been outlined even those persons who are employed in industries operating 24 hours a day will participate. A shift going to work at 8 o'clock in the morning will have an added daylight hour after work, the shift going on at 4 in the afternoon will have an additional hour of light in which to work, and although the shift beginning work at midnight will lose an hour of daylight it will gain with the other shifts because of the system of rotation in shifts commonly used.

Advantages for all classes.—The advantages extend to all parts of the community. Farmers will have an opportunity to market their produce earlier, thus offering it in better condition and gaining an hour of daylight for other work. Transportation companies will move a larger part of their traffic in daylight, thus increasing efficiency and minimizing danger of accidents. Shopkeepers and their employees will avoid an hour of darkness. Office people will work under less artificial light.

No scientific objection.—To the proposal there are no serious scientific objections, according to the testimony of eminent astronomers. English astronomers have said that meridians of longitude are made for man and not man for meridians, and that the clock is a mere symbol representing intervals of time according to standards which are largely arbitrary. American astronomers who have been consulted have the same point of view.

European precedents.—Of the practical results of the proposal there has been during the last summer demonstration in Europe, where it was adopted during the summer months (for summer time see Appendix C) by Austria, Denmark, England, France, Germany, Italy, Holland, Norway, Portugal, and Sweden. In some of these countries official inquiries are understood to be now in progress for the purpose of ascertaining the concrete results. Unofficial statements seem to leave no dount, however, that the same plan will be put into effect next summer, and that efficiency was increased in all parts of the population and important savings in fuel and illuminants were accomplished at a time when the belligerent countries were conserving their resources to the utmost extent possible.

American precedents.—There has been successful experience in the United States too. Cleveland and Detroit in 1914 set their clocks an hour forwrad. Offidials and commercial organizations in these cities testify that the change was made without the least difficulty and has met with universal favor. The action of these cities independently of other communities in their vicinity has probably owed a part of its success to the fact that they lie in the eastern part of the zone of central standard time, and consequently near the zone of eastern time, which they adopted.

Committee's alternate plan.—The committee has stated its preference that clocks should be advanced one hour and permenantly kept ahead by that interval. If such plan should not prove feasible, the committee recommends that clocks should be advanced one hour on April 1 each year and turned back on November 30.

The greatest amount of daylight now unutilized in our active hours comes between the equinox in March and the equinox in September. Accordingly, the proposal would confer its greatest advantages between these dates. In the United States with its large centers of railroad trnasportation and hundreds of trains in motion at all times, two changes of time a year, even if made at moments of minimum railway traffic, such as midnight on a Sunday, might cause some inconvenience. Traffic is to a degree seasonal, however, and schedules are frequently changed about April 1 and November 30, ordinarily on a Sunday. Accordingly, if the advantages of the proposal do not appear material enough during winter months to warrant an all-year change, and "summertime" alone is to be adopted, as in European countries, the two changes of the clock should come at the seasons when our railways now generally readjust their schedules.

Uniformity.—Whatever the plan adopted—i. e., whether the clock is advanced once for all or is changed twice each year—the change should occur simultaneously in all parts of the country. Otherwise, confusion will arise and we shall return to the unfortunate state of affairs which existed before "standard" time was generally adopted in 1883 upon the initiative of the railways. Standard time, it will be

recalled, rests upon concerted action upon the part of the railways and not upon any enactment of Congress; several States subsequently adopted it as a matter of law, but Congress has never done so.

Difficulties in local adoption.—Wherever the plan has been tried merely in a local way, and without especially favorable circumstances, there have been difficulties, and in some cases abandonment has been forced without a fair trial. For example, when Manchester, N. H., tried the plan without cooperation from the rest of New England it had to give it up because of resulting confusion. Similarly, Hamilton, Ontario, undertaking to act without concurrence from Toronto, failed to obtain the inherent benefits. Other cities in Canada, including Halifax, London, Brantford, and Calgary, have found corresponding obstacles to local action.

Committee's recommendation.—Uniformity should be obtained, the committee recommends, through an act of Congress establishing the time for each part of the country as one hour in advance of the present standard time.

Power of Congress.—That Congress has authority under the Constitution to enact such a law the committee feels assured. The committee has had the benefit of the views of very able lawyers, who have asserted that the commerce clause and the clause regarding establishment of post offices and post roads confer ample power.

The desirability that Congress should exercise its power is manifested by the national advantages which will accrue in ways outlined in this report and by the necessity of a uniform system of time throughout all parts of the country. Unless clocks in Seattle, Denver, St. Louis, and all other communities are moved forward one hour when clocks at New York and Boston are advanced one hour, inevitable confusion would result, to the detriment of many of our most important business interests.

ROBERT GARLAND, *Chairman*,
PAUL W. BROWN,
A. LINCOLN FILENE,
J. P. HARDY,
EUGENE U. KIMBARK,
EDWARD D. PAGE,
T. C. POWELL,
HARPER SIBLEY,
Committee on daylight saving.

APPENDIX B.—REPORT OF A COMMITTEE OF THE HOUSE OF COMMONS.

In 1908 a committee of the House of Commons reported favorably a bill for moving the clock one hour ahead between the third Sunday in April and the third Sunday in September, stating the results would be:

To promote the greater use of daylight for recreative purposes.

To lessen the use of houses licensed for the sale of intoxicating liquors.

To facilitate the training of the Territorial Force.

To benefit the physique, general health, and welfare of all classes of the community.

To reduce the industrial, commercial, and domestic expenditure on artificial light.

That the object of the bill, which is desirable and would benefit the community, can not be attained without legislation.

And that an alteration of the clock of one hour in April, and a similar alteration of one hour in September, is the best mode of attaining the object of the bill.

APPENDIX B.—STANDARD TIME AND STANDARD TIME SECTIONS—STATEMENT OF THE UNITED STATES BUREAU OF STANDARDS.

The use of standard time in sections differing by integral hour differences of longitude from Greenwich instead of local mean time has now become nearly universal throughout the civilized world. Practically all the nations of Europe have abandoned their local meridian time in favor of this important change to the use of a common meridian of reference. * * * As an introduction to the table of the boundary points of the different time sections in the United States it may be well to explain briefly what the difference is between standard time and mean local time and how the country is divided up into different time sections.

The mean local time of any place is the time in mean solar days reckoned from the mean time of the sun's passage across the meridian through that place as the point of reference for the time. The mean solar day is the average, throughout the year, of the time between two successive passages of the sun across any given meridian of the earth. The actual time of transit of the sun across the meridian varies from mean noon throughout the year, due to the elliptical shape of the earth's orbit, the total

variation being about 32 minutes. Therefore, in order that the days measured by the sun's transits may not be of varying duration, the instant of transit of a "mean sun" or imaginary sun is taken as the zero, and the intervals between such assumed transits of a "mean sun" are designated as mean solar days.

Standard time is mean solar time, so far as its duration or unit of measurement is concerned; the difference between it and mean local time lies in the point of reference from which it is measured. In order to avoid the troubles arising from each place using its own local time reckoned from the transit of the "mean sun" across the local meridian, the country is divided into standard time sections of approximately 15° of longitude in width and each place in the time section uses, instead of its own local time, the time counted from the transit of the "mean sun" across the seventy-fifth meridian west of Greenwich, or of the ninetieth, one hundred and fifth, or one hundred and twentieth meridian, depending upon the time section in which the place is located. * * *

The question of changing from the time of one time section to that of another arises in practice almost exclusively in the operation of railroads, however, and because of the inconvenience of changing the time by the necessary amount of one hour at every point where a railroad crosses one of these boundary meridians the more convenient practice has been followed of making the change usually at some terminal or division point on the road, or at some junction point, or at the boundary line between the United States and Canada. The result is that practically the boundaries of the time sections are defined by the lines connecting these railroad points of time change and because of the location of these railroad junctions or terminals the resulting lines are quite irregular. * * *

As stated before, the difference of standard time between two adjacent time sections is just one hour, inasmuch as the equivalent of the difference of 15° of longitude between the reference meridians amounts to one hour in time. Hence, when it is noon at any point in the eastern time section it is 11 a. m. at all places in the central time section, 10 a. m. in the mountain time section, and 9 a. m. in the Pacific time section. In traveling westward, therefore, from one time section to another, one must set his watch back one hour, while in traveling eastward the watch should be set ahead one hour whenever he passes from one time section to another.

APPENDIX C.—ENGLAND'S DAYLIGHT SAVING LAW.

[Summer-time act, 1916, 6 and 7 Geo. 5, Cap. 14.]

An act to provide for the time in Great Britain and Ireland, being in advance of Greenwich and Dublin mean time, respectively, in summer months (May 17, 1916.)

Be it enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

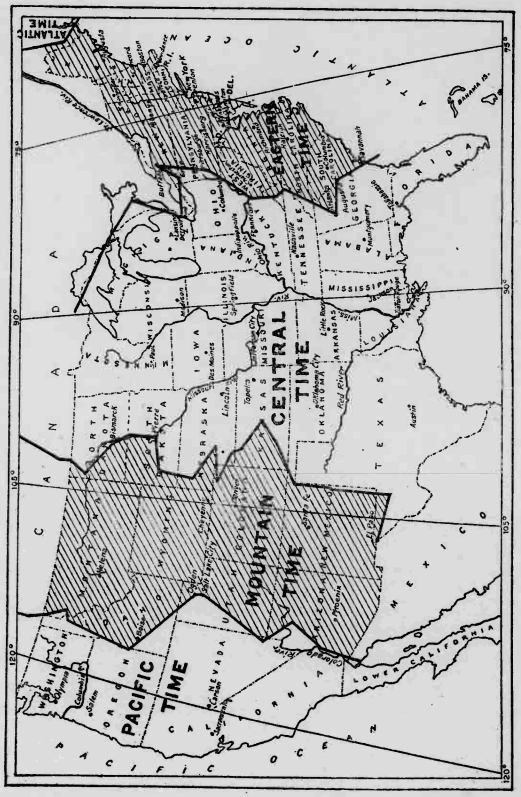
1. *Time in summer months.*—(1) During the prescribed period in each year in which this act is in force, the time for general purposes in Great Britain shall be one hour in advance of Greenwich mean time.

(2) This act shall be in force in the year 1916, and in that year the prescribed period shall be from 2 o'clock in the morning Greenwich mean time on Sunday the 21st day of May, until 2 o'clock in the morning Greenwich mean time on Sunday, the 1st day of October, and His Majesty may in any subsequent year, by order in council made during the continuance of the present war, declare this act to be in force during that year, and in such case the prescribed period in that year shall be such as may be fixed by order in council.

(3) Wherever any expression of time occurs in any act of Parliament, or in council, order regulation, rule for by-law, or in any deed, time table, notice, advertisement, or other document, the time mentioned or referred to shall be held, during the prescribed period, to be the time as fixed by this act: *Provided*, That where in consequence of this act it is expedient that any time fixed by any by-law, regulation, or other instrument should be adjusted and such adjustment can not be effected except after the lapse of a certain interval or on compliance with certain conditions, the appropriate government department may, on the application of the body or person by whom the by-law, regulation, or other document was administered, make such adjustment in the time so fixed as in the circumstances may seem to the department proper, and if any question arises as to what government department is the appropriate government department, the question shall be finally determined by the treasury.

(4) This act shall apply to Ireland in like manner as it applies to Great Britain, with the substitution, however, of references to Dublin mean time for references to Greenwich mean time.

STANDARD-TIME SECTIONS AS USED BY THE RAILWAYS.



(5) Nothing in this act shall affect the use of Greenwich mean time for purposes of astronomy, meteorology, or navigation, or affect the construction of any document mentioning or referring to time in connection with such purposes as aforesaid.

2. *Short title.*—This act shall be cited as the summer-time act.

APRIL 25, 1917.

Boston Chamber of Commerce to the executive committee and board of directors:

Your special committee on daylight-saving plan feels that with the development of the war and the fact that this country is now actively engaged in preparing for a prolonged struggle, certain steps must be taken for the good of the country. More food must be produced and intensive farming must be undertaken throughout Massachusetts and throughout the country. At the present time as pointed out in the findings of your committee submitted heretofore to the board of directors, the average mand does not have a sufficient period of daylight after his work in the afternoon is over, to undertake any effective cultivation of land.

Under the daylight-saving plan an extra hour of daylight in the afternoon is provided in which this farming could be done. In addition to this great benefit, the workers of the Nation will experience the gains in health, efficiency, and economy which were experienced by the 11 countries of Europe which operated the plan last year and which are renewing it again this year.

Your committee believes that if we are to realize the full benefits of the plan toward conservation and development of our food supply, the time to act is the present when preparation of the soil and planting must be done.

Your committee, therefore, respectfully urges (1) that the Boston Chamber of Commerce go on record strongly in favor of the adoption of this plan of setting the clock one hour ahead as an emergency measure in the present crisis; (2) that your committee be authorized to place the emergency nature of this measure before the public through the newspapers, etc.; (3) that they be authorized to take steps to secure the adoption of an Executive order by the President putting into effect the daylight-saving plan on a nation-wide basis.

Respectfully submitted.

A. LINCOLN FILENE, *Chairman.*
HENRY ABRAHAMS,
EDWARD A. BIGELOW,
HOWARD M. BISCOE,
ROBERT BURGESS,
DAVID A. ELLIS,
JOSEPH A. PARKS,
ROBERT W. WILLSON,
EDWARD F. WOODS.
Special Committee on Daylight-Saving Plan.

The CHAIRMAN. The next gentleman to be heard is Mr. A. Lincoln Filene.

STATEMENT OF MR. A. LINCOLN FILENE, TREASURER AND GENERAL MANAGER WILLIAM FILENE SONS' CO., BOSTON, MASS.

Mr. FILENE. Mr. Chairman and gentlemen of the committee, the daylight saving plan is inexpensive, simple in its method, easy of accomplishment, and laden with benefits to us and our families.

So great has been its benefits and possibilities that it was adopted last year by England, France, Germany, Italy, Norway, Sweden, Denmark, Holland, and Portugal, and this year by Australia and Iceland. The Canadian Government is awaiting our decision and they are ready to follow it if we adopt the plan.

The success of the plan in Europe is testified to by reports of special commissions appointed to study the matter.

England will continue the plan after the war, though it was originally adopted as a war measure to conserve the material and human strength of Great Britain.

We have heard of no nation which did not experience all of the benefits claimed for the plan.

The report of the English parliamentary commission shows there have been large savings in the lessened danger from accidents toward the end of the work day, in the health of the worker, and in the efficiency of the worker.

If the daylight saving plan is adopted by this country, it will bring additional benefits. Workers, other than those engaged in agricultural pursuits, will have an extra hour of daylight after the workday is over in which to work their gardens.

The population of the United States is 102,826,309. There are 20,000,000 men and boys engaged in trade, transportation, manufacturing and mechanical pursuits. A considerable proportion and a large proportion of these are undoubtedly engaged in planting. To them the extra hour of daylight will be of tremendous value. Farmers and other agricultural workers would derive substantial benefits. Children, as well as adults, would have enlarged opportunities for outdoor recreation or useful activity.

The Boston Chamber of Commerce has spent over six months studying the plan and has gone into every phase of it.

Prof. Robert W. Willson, Harvard astronomy department, has prepared the book on Sunrise and Sunset, and is completing tables showing how the plan would operate in every city in the United States of over 20,000 population. One of his tables, showing points in the United States where railroads change their time, I now present to you. Prof. Willson has studied the railroad side of the matter and will be glad to come here to discuss it before you.

The Boston Chamber of Commerce favors the plan for the entire year, but if a shorter period is more feasible, then it favors the shorter period. The United States Chamber, which I also represent makes the same recommendation.

The most important point I want to leave with you is that we need daylight saving now. Every day that passes without the plan means the loss of a precious hour of daylight which could have been utilized in the preparation and planting of the soil, a matter of great importance to us in this crisis. It means that we are not taking the opportunity to conserve the strength of our workers, that we are not conserving our coal and other material resources.

We have a letter from Mr. Gompers, president of the American Federation of Labor, standing for the movement, and a letter from the President of the United States himself. The advisory committee of the National Council of Defense has placed its approval on the plan, and also the Massachusetts Committee on Public Safety.

The CHAIRMAN. You may put those in the record.

Mr. FILENE. Yes; I will supply those.

Senator SAULSBURY. Have you made any investigation or got any witnesses where they have tried it in this country?

Mr. FILENE. May I ask Mr. Daniel Bloomfield, who has been working with me, to answer that question? He is my associate.

Senator SAULSBURY. All right.

Mr. FILENE. There is one thing you asked me. We have the opinion of Prof. Guthrie as to whether section 8 of Article I of the Constitution vests in Congress power to fix a standard time for the whole country. I should like to include that letter in this record.

Senator KELLOGG. It clearly is constitutional as a regulation of interstate commerce and as a regulation of all offices of the Government. There can be no doubt about that.

Mr. FILENE. We should like to have that letter and some other documents made a part of the record.

The CHAIRMAN. That may be included in the record.

(The documents referred to are here printed in full, as follows:)

WILLIAM D. GUTHRIE,
44 Wall Street, New York, August 28, 1916.

DEAR MR. FILENE: I have your letter of August 24, submitting to me the question whether section 8 of Article I of the Constitution vests in Congress power to fix a standard time for the whole country, under the grant of power to "fix the standard of weights and measures."

It seems to me that it was not the intendion of the framers of the Constitution, by the use of the word "measures," to include the standardization of the time of the whole country, or, as you put it, to include "measures of time."

However, Congress could, in my opinion, constitutionally, under its power to regulate interstate commerce and to establish post offices and post roads, provide by appropriate legislation that the time in all interstate commerce or post-office matters should be readjusted by moving the clock forward one hour. It is obviously a matter that could not be practically left to each State to regulate for itself, for the probable conflict would produce chaos, and, therefore, it is inherently a matter, if at all connected with commerce and the post office, which should be within the exclusive jurisdiction of the Federal Government. Such a statute would have to be carefully worded so as to adjust our present arrangement of difference in time between the various parts of the country.

Very sincerely, yours,

(Signed) WILLIAM D. GUTHRIE,
Professor of Constitutional Law, Columbia University.

A. LINCOLN FILENE, Esq.,
Washington, Summer, and Hawley Streets, Boston, Mass.

Statement from New England Committees on Public Safety.

(Copy.)

We, the undersigned, delegates from the committees of public safety of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and the Connecticut Council of Defense, unanimously favor the daylight saving plan, and advocate that our governors, committees, and council urge its immediate adoption by Congress as a war measure.

(Signed) ROBERT BRAUN (Maine).
ARTHUR B. JENKS (New Hampshire).
FREDERICK H. BABBITT (Vermont).
CHARLES F. WEED (Massachusetts.)
ROBERT L. BRUNOT (Rhode Island.)
HOWARD A. GIDDINGS (Connecticut).

STATE HOUSE, BOSTON,
May 1, 1917.

Among those who urge the daylight saving plan are—
The United States Chamber of Commerce, comprising over 800 trade bodies.
American Federation of Labor.
Advisory Commission to the National Council of Defense.
Massachusetts Committee on Public Safety.
Connecticut Committee on Public Safety.
New Hampshire Committee on Public Safety.
Vermont Committee on Public Safety.
Maine Committee on Public Safety.
Rhode Island Committee on Public Safety.
Massachusetts Board of Agriculture.
And hundreds of individual trade organizations.

(Copy.)

DEAR MR. BLOOMFIELD: As regards the length of the summer-time period: You will have observed from the report of the "summer-time committee" that the general opinion of those from whom evidence was taken favored a period from the beginning of April to the end of September; but that the committee decided to recommend the second Sunday in April to the third Sunday in September, principally on account of the representations received from Ireland, but also having regard to the interests of the very early risers amongst the working classes. But for Ireland, the committee would, I think, have recommended a somewhat longer period of application, though they would certainly not have gone beyond the limits of April and September.

As you will no doubt have heard, the Government here have adopted the recommendations of the committee for 1917. Summer time was reintroduced in Great Britain and Ireland at 2 o'clock in the morning of Easter Sunday and will last until 2 o'clock in the morning of Monday, the 17th September.

I will keep you informed of events here, and shall be interested to hear of further developments on your side.

Yours, very truly,

(Signed) M. H. WHITELEGGE,
Member Parliamentary Committee, England.

P. S. The dates in France are March 24 to October 7; in Italy, March 31 to September 30; in Portugal, March 1 to the end of October; in Germany, Austria, and Holland, April 16 to September 17. I have not heard at the time of writing of a definite decision from Denmark, Norway, or Sweden, or from Spain.

M. H. W.

The CHAIRMAN. We will next hear Mr. Sidney Colgate.

STATEMENT OF MR. SIDNEY COLGATE, PRESIDENT OF THE COLGATE CO., JERSEY CITY, N. J.

Mr. COLGATE. Mr. Chairman and gentleman, with us daylight saving is a fact and not a theory. We have tried it out; we have been able to try this out because to a certain extent, although being in a large community, we are isolated, that is, we are probably in lower Jersey City the largest factory and office, and also because our business is isolated, that is, we are not a broker among a lot of brokers; we are not a dry goods establishment among a lot of dry goods establishments; we are manufacturers and we manufacture a trade-mark article, so to a certain extent we can make our hours as we wish them, and we do not have to consider our neighbor right alongside of us. The one thing we have to consider is train accommodations for our employees. That, of course, is very essential.

We started this daylight saving plan in the summer of 1915. We tried it beginning with the middle of July and we thought we would try it until the 1st of September. Toward the end of August we took a vote as to whether we should continue it to 1st of October, and we got a vote of 94 per cent to continue it to the 1st of October.

Senator CALDER. The people among your employees?

Mr. COLGATE. The people among our employees. Then again you should consider that a great many of them were inconvenienced by train service. You see the train service into New York City is regulated to get the bulk of the commuters in between 8 and 9 o'clock; most of the offices open at 9 o'clock, whereas our people have to get in there at 8 o'clock, so they have to take the service between 7 and 8, which is not nearly as convenient.

It has worked nicely in our office. We see the difference in the morale of the office; we see the difference in the work which we get out of the clerks. I have talked with them and they said that the work seemed to go better in summer than in winter. Some of them said to me, "Mr. Colgate, now we get out at 4 o'clock instead of 5 and we can accomplish something in daylight; we can make little plans for excursions; we can plan to look after our gardens; we can plan to be with our families. It is a very different thing and we feel like working more." The work has speeded up and is very much better in summer time than in winter. Also the hours which they work are better. You know that the last hour of a hot summer afternoon drags with all of us, no matter what we are doing.

I said to one of our employees last summer, "Jim, you do not seem to have taken a vacation this summer. I have noticed you have not been away from the office at all." He said, "Mr. Colgate, I feel that I have had a vacation all summer long, and I have never been in such good condition." He said, "That last hour I get off in daylight is worth everything to me."

The plan can be accomplished and accomplished very easily. Pardon these little details, but I wish to relate them because I think they are the things that count in a question like this. The wife of our manager said, "Why, Jim, you can not set the clock ahead like that; it will upset all my home work and everything else, and things will go all ajig." He said, "Well, I could not convince her." You know it is hard to argue with a woman at times. He said, "I was coming from San Francisco to New York, and I am in the habit always of winding my watch and my wife's watch at night and setting it, if necessary, fixing it up." He said, "I did this coming from San Francisco to New York,"—you can see the end of my story before I get to it. "I said to her one day, 'Mary, have you noticed any difference to-day; has to-day seemed to go any different, etc.?' She said, 'No; not at all; it has been just like any other day.'" "Well," he said, "I set your watch ahead an hour this morning."

I do not know anything I can add.

The CHAIRMAN. We thank you.

Senator CALDER. We should like the committee to hear from Mr. Robert L. Brunet.

STATEMENT OF MR. ROBERT L. BRUNET, PUBLIC SERVICE ENGINEER, PROVIDENCE, R. I.

Mr. BRUNET. Mr. Chairman and gentlemen, after a very thorough investigation of daylight saving our lighting committee of the city council of the city of Providence unanimously passed a resolution approving the daylight saving plan, providing it is made nation-wide, which I will include in the record with the approval of the chairman.

It is as follows [reading]:

No. 125. Resolution approving daylight saving plan, providing same is made nation-wide. (Mr. Austin.)
Approved March 10, 1917.

Resolved, That the city council does hereby approve of the proposed "daylight saving" plan, provided the necessary legislation is adopted so as to make the plan operative throughout this country, and to that end the Senators and Representatives in Congress from Rhode Island are respectfully urged to support any legislation having as its object the establishment of the "daylight saving" plan throughout the United States; and it is further

Resolved, That a copy of this resolution be transmitted to said Senators and Representatives.

If the time had not been so short we would have had resolutions to present to your committee which we think would have been signed by all of the governors of the New England States.

I have prepared certain charts which graphically indicate the benefits of the plan, not only as a matter of convenience and human necessity, but also of the war measure of astounding proportions. I think the American people, as a rule, are looking for economies and conservation, particularly at this time in view of the fact that we have got to prosecute this war with all the efficiency that we can muster. And I also want to show by the first chart (plate A) that the plan itself, gentlemen, is just a matter of convenience.

The first chart shows the time zones of the country, placed in operation by the railroads of the United States in 1883. They suggested at that time that all the territory east of this heavy black line be called the eastern time zone and it be based on the seventy-fifth degree of longitude west of Greenwich; central time is the zone between the next two black lines; the mountain time zone between these two [indicating]; and the Pacific zone as indicated on the chart.

The CHAIRMAN. I thought there were five zones?

Mr. BRUNET. There is Alaska, which I have not included. As a matter of fact, when it was put into operation, through necessity or otherwise, the actual eastern time zone is shown by this dotted line. There is a variation of about 32 minutes between the sun time and this line, and the sun time and this line [indicating], which shows conclusively, gentlemen, that time is a matter of human convenience. The reason the line varies on this chart and looks like a snake is due to the fact that the railroads found it most convenient to change times at certain points in passing from one zone to the other, and incidentally Florida desired to be in the central zone instead of in the eastern zone because so much of its business was between it and the Southern States west of it.

Senator KELLOGG. Those zones have adjusted themselves in their present form through railroad and business convenience?

Mr. BRUNET. Absolutely.

Senator KELLOGG. And have been settled for many years?

Mr. BRUNET. Yes, sir.

The CHAIRMAN. Why do you not conform your zones to the established lines that now exist?

Mr. BRUNET. Because, for instance, Buffalo or some other city would prefer to be in the eastern time zone instead of the central.

Senator KELLOGG. They do; this bill conforms it to exactly the same thing.

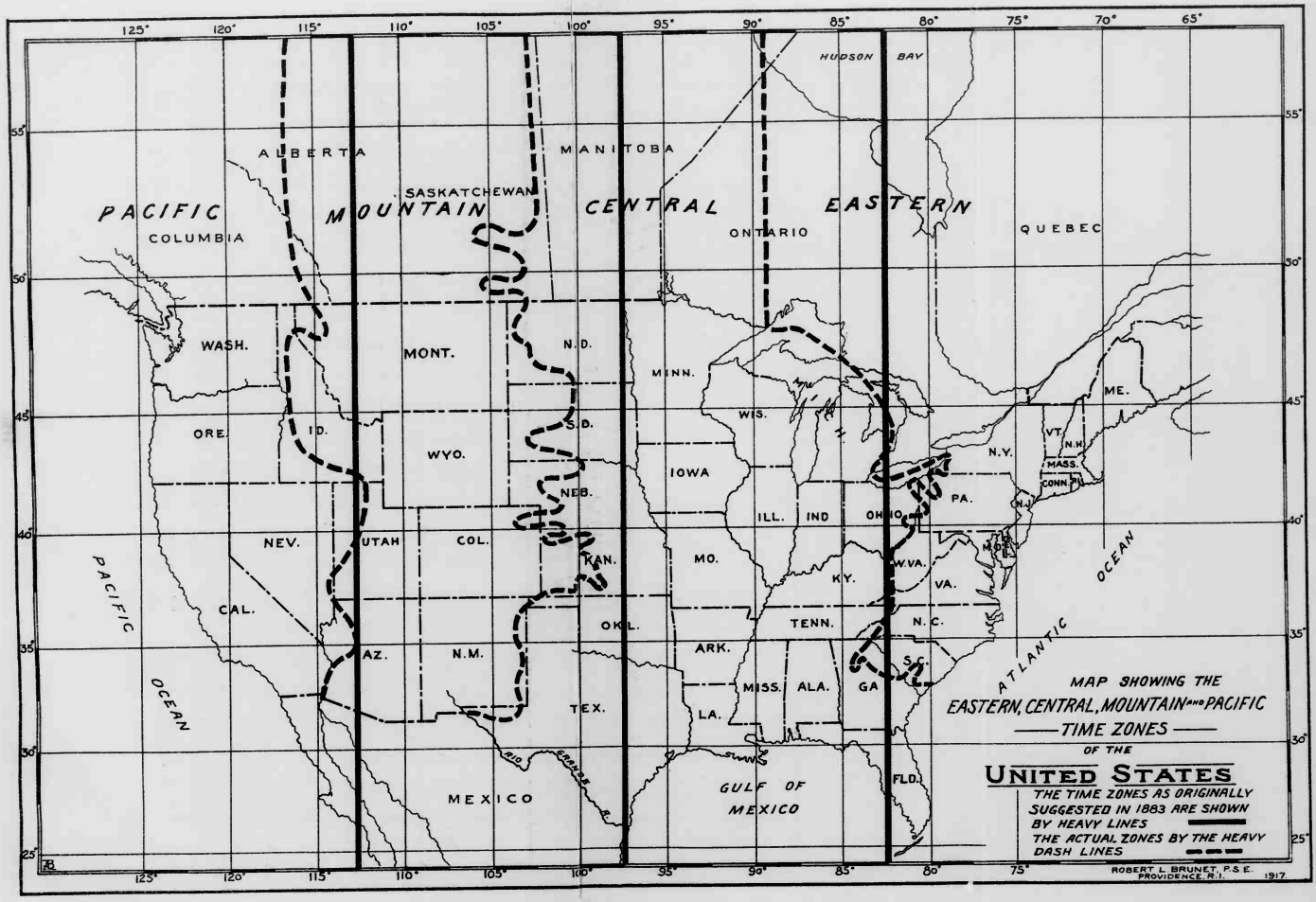
The CHAIRMAN. Your chart does not.

Mr. BRUNET. This is a recommendation and this is the actual time zone. We do not propose to change the time zones in any sense whatever.

The CHAIRMAN. That is what I want to know. I thought you did in those particulars indicated by those black lines.

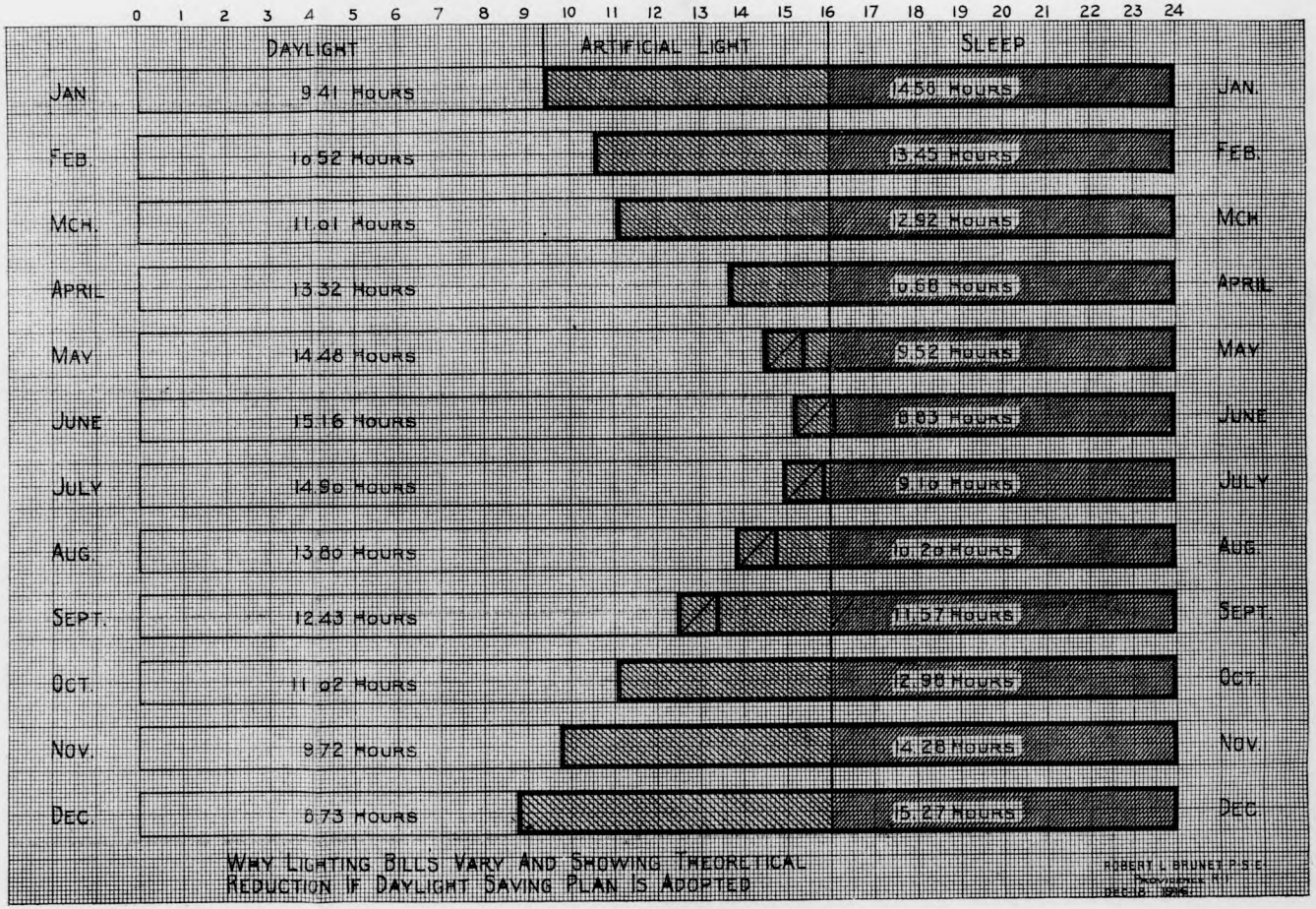
Mr. BRUNET. The next point I want to show is for the month of June as shown by Plate B. It shows the present schedule under which we operate and the proposed schedule under the daylight-saving plan. The sun rises in the month of June at about 4.20 o'clock in the morning.

PLATE A.



99706. (To face page 22.)

PLATE E.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
DAYLIGHT
ARTIFICAL LIGHT
SLEEP
JAN.
9.41 HOURS
14.59 HOURS
JAN.
FEB.
10.52 HOURS
13.45 HOURS
FEB.
MCH.
11.01 HOURS
12.92 HOURS
MCH
APRIL
13.32 HOURS
10.68 HOURS
APRIL
MAY
14.48 HOURS
9.52 HOURS
MAY
JUNE
15.16 HOURS
8.83 HOURS
JUNE
JULY
14.90 HOURS
9.10 HOURS
JULY
AUG.
13.80 HOURS
10.20 HOURS
AUG.
SEPT.
12.43 HOURS
11.57 HOURS
SEPT.
OCT.
11.02 HOURS
12.98 HOURS
OCT.
NOV.
9.72 HOURS
14.28 HOURS
NOV.
DEC.
8.73 HOURS
15.27 HOURS
DEC.
WHY LIGHTING BILLS VARY AND SHOWING THEORETICAL REDUCTION IF DAYLIGHT SAVING PLAN IS ADOPTED
ROBERT L. BRUNET P.S.E.
PROVIDENCE, R.I.
DEC. 18 1916

INTENTIONAL SECOND EXPOSURE

PLATE E.

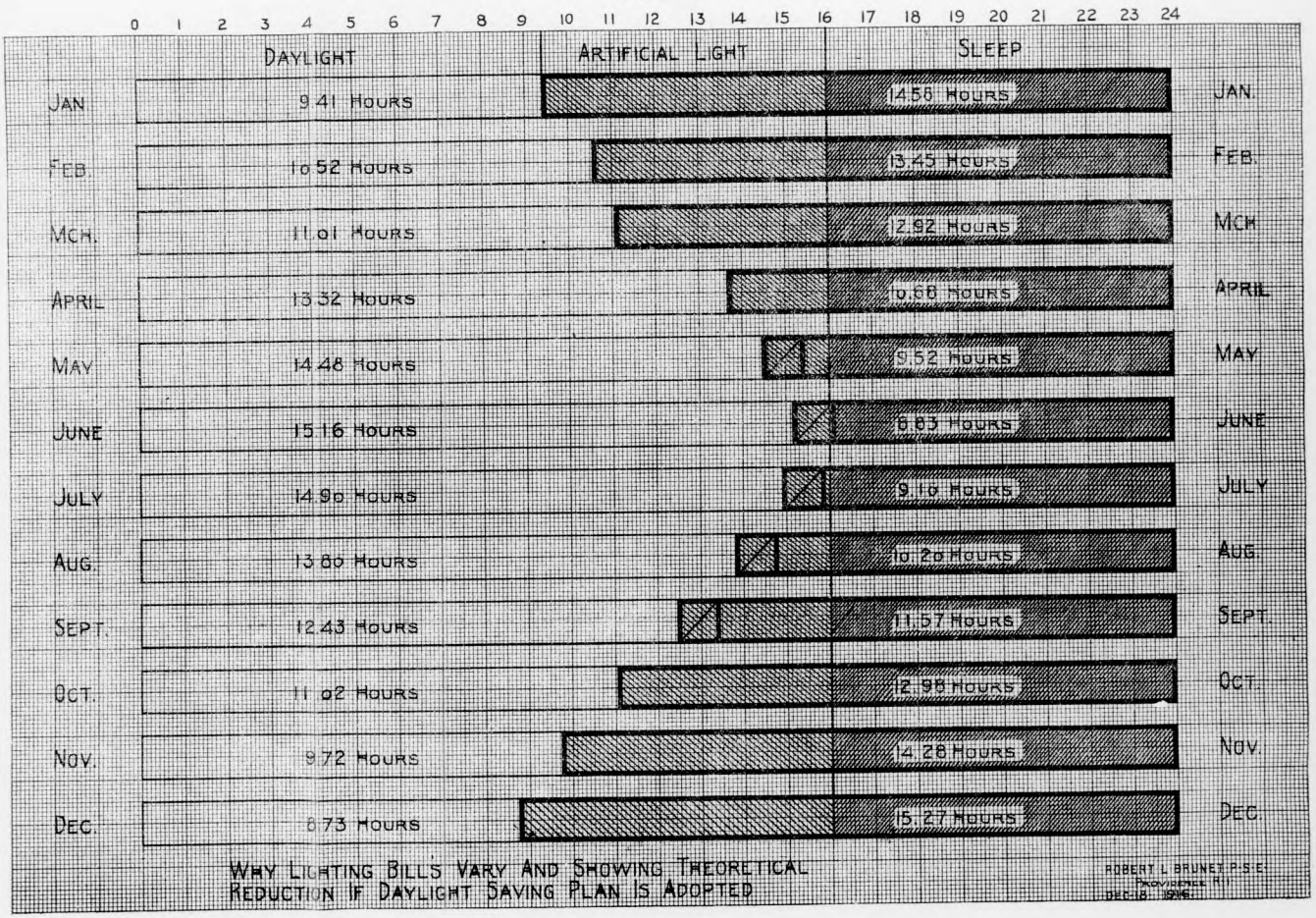
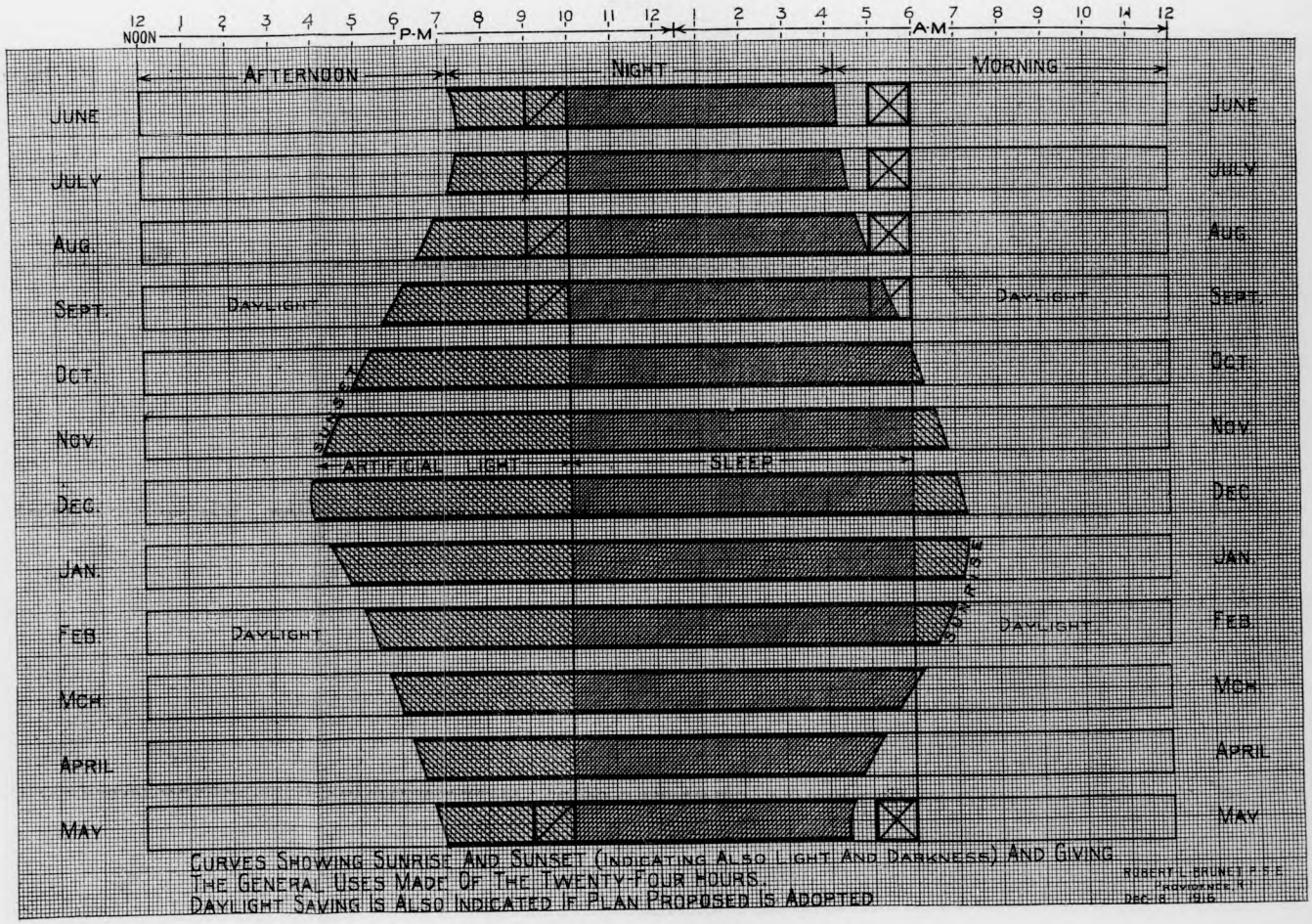


PLATE D.

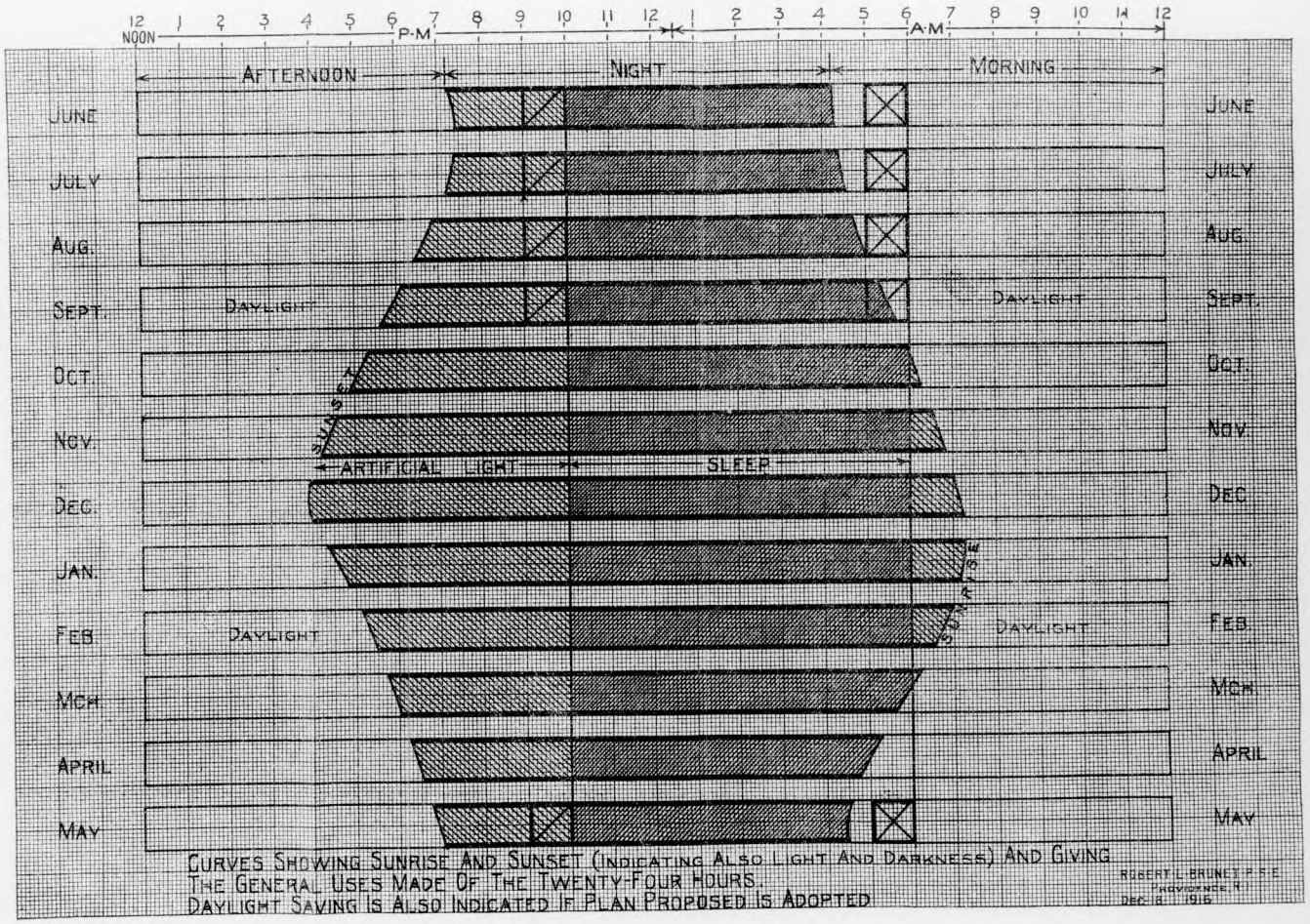


CURVES SHOWING SUNRISE AND SUNSET (INDICATING ALSO LIGHT AND DARKNESS) AND GIVING THE GENERAL USES MADE OF THE TWENTY-FOUR HOURS. DAYLIGHT SAVING IS ALSO INDICATED IF PLAN PROPOSED IS ADOPTED.

ROBERT L. BRUNET C.E.
PROVIDENCE, R.I.
DEC. 8 1915

INTENTIONAL SECOND EXPOSURE

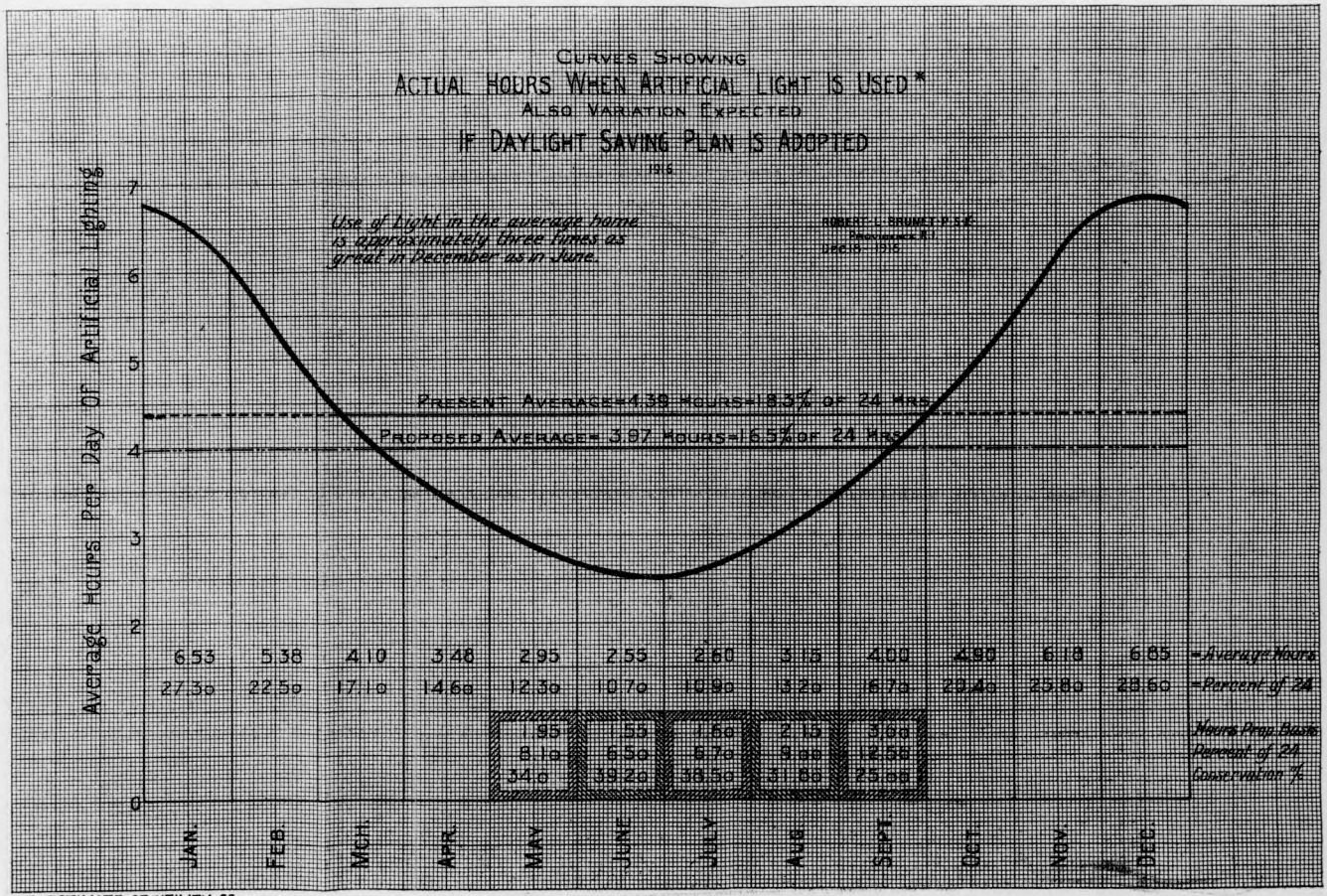
PLATE D.



CURVES SHOWING SUNRISE AND SUNSET (INDICATING ALSO LIGHT AND DARKNESS) AND GIVING THE GENERAL USES MADE OF THE TWENTY-FOUR HOURS. DAYLIGHT SAVING IS ALSO INDICATED IF PLAN PROPOSED IS ADOPTED

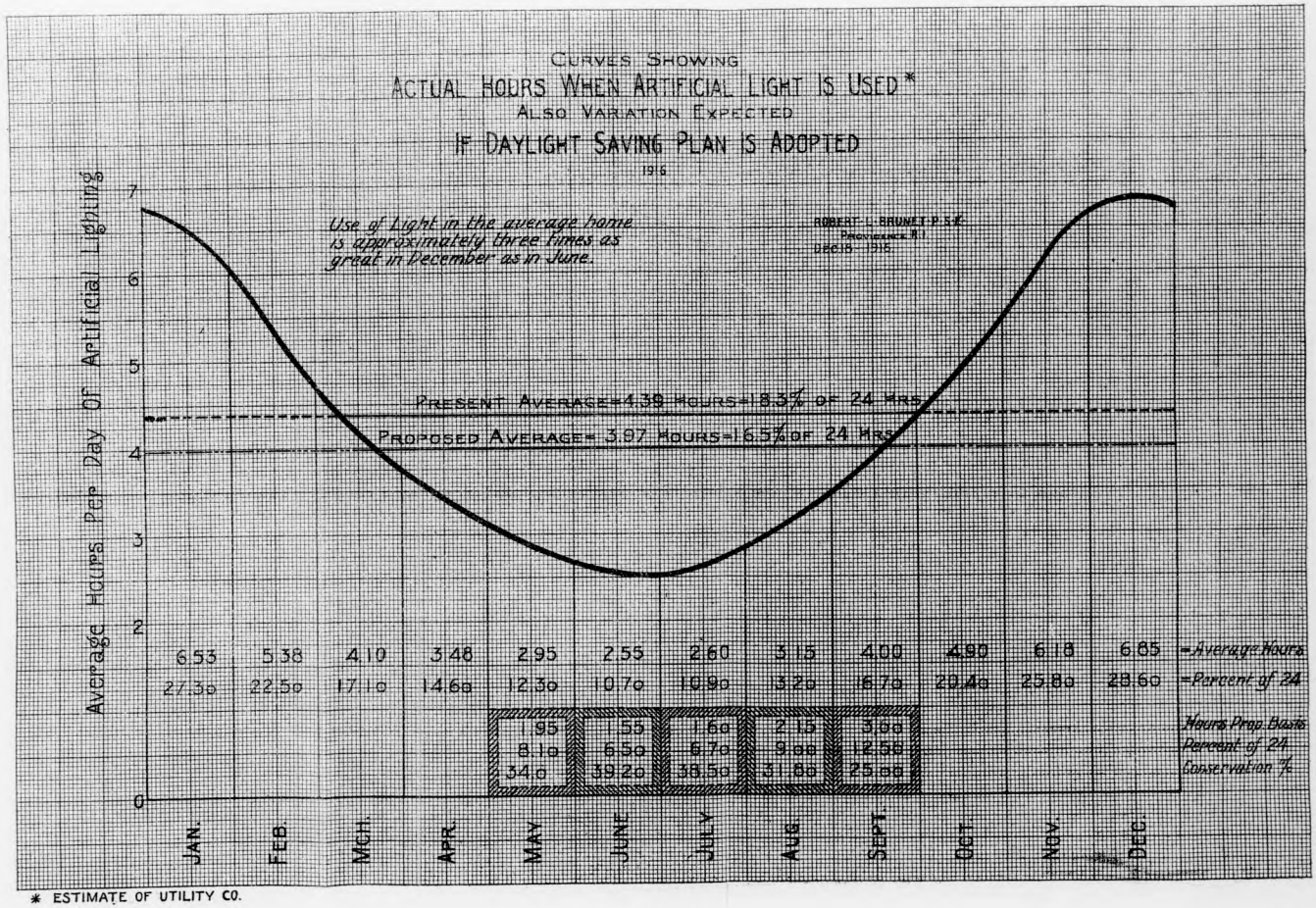
ROBERT L. BRUNET, P. E.
PROVIDENCE, R. I.
DEC. 8 1915

PLATE C.



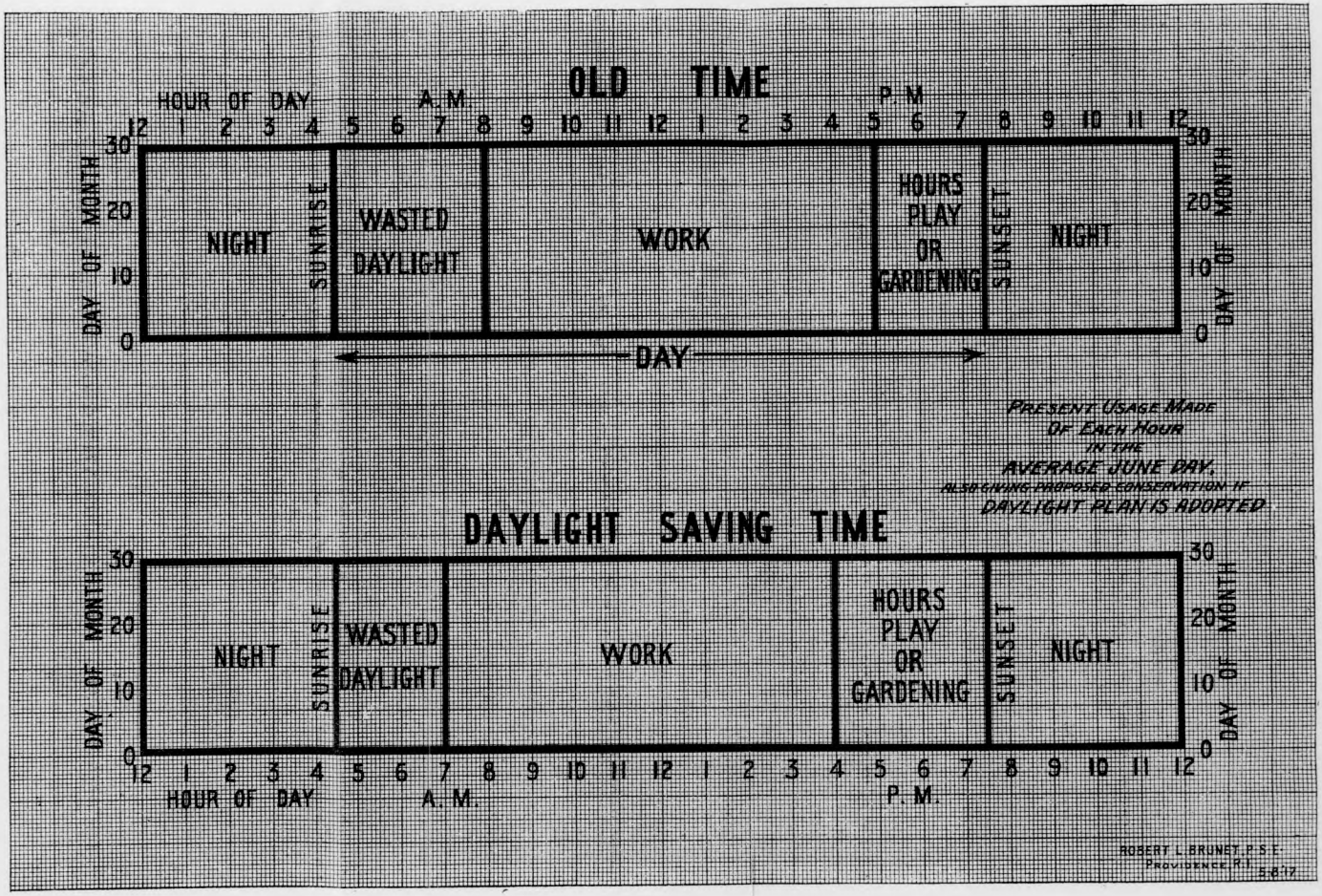
* ESTIMATE OF UTILITY CO.

INTENTIONAL SECOND EXPOSURE


CURVES SHOWING
ACTUAL HOURS WHEN ARTIFICIAL LIGHT IS USED*
ALSO VARIATION EXPECTED
IF DAYLIGHT SAVING PLAN IS ADOPTED
1916
Use of Light in the average home is approximately three times as great in December as in June.
ROBERT L. BRUNET P.S.C. Providence R.I. DEC. 15 - 1915
Average Hours Per Day Of Artificial Lighting
PRESENT AVERAGE=4.39 HOURS=18.3% OF 24 HRS.
PROPOSED AVERAGE= 3.97 HOURS=16.5% OF 24 HRS.
6.53 5.38 4.10 3.48 2.95 2.55 2.60 3.15 4.00 4.90 6.18 6.85 =Average Hours
27.3o 22.5o 17.1o 14.6o 12.3o 10.7o 10.9o 13.2o 16.7o 20.4o 25.8o 28.6o =Percent of 24
1.95 1.55 1.6o 2.15 3.0o
8.1o 6.5o 6.7o 9.0o 12.5o
34.o 39.2o 38.5o 31.8o 25.0o
Hours Prop. Waste
Percent of 24
Conservation %
JAN. FEB. MCH. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

* ESTIMATE OF UTILITY CO.

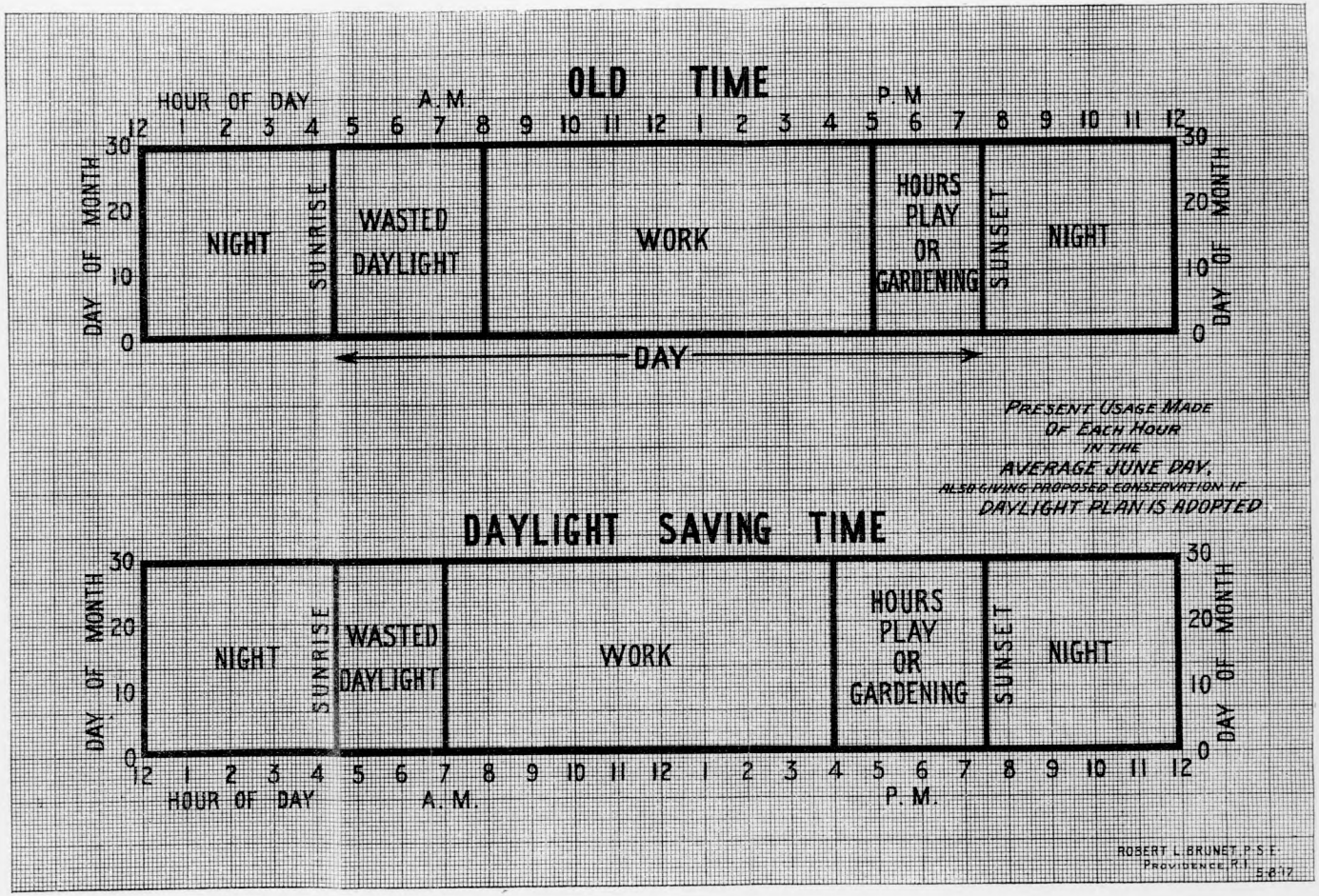
PLATE B.



99706. (To face page 22.) No. 1.

INTENTIONAL SECOND EXPOSURE

PLATE B.



Senator KELLOGG. What zones are you speaking of; the eastern?

Mr. BRUNET. Yes, any zone; this is just the average condition. The sun rises at say 4.20 o'clock in the morning; we have daylight from 4.20 until 8 o'clock. Under the daylight saving plan we take an hour off the morning and add it to the evening period, so we have extended our time so we may have an hour gardening, etc., and the difference is shown on the chart.

The next chart (plate C) shows the conservation that we can effect in our use of artificial light. This chart shows the use of light in an average home during the whole season. For instance, in the month of January we use light about six and one-half hours a day; going down to June we use light about 4.55 hours a day. With such a saving plan we estimate that for the five months proposed we will cut our lighting bills down to about one-third what they have been in the past, which is a tremendous item. For the city of Providence, R. I., alone, we can save $62,000 for the time, based on the estimate of the Public Utilities Co., and that represents about 40 per cent per capita, and for the whole United States I have estimated the conservation will approximate $40,000,000.

Senator KELLOGG. In the lighting by the people?

Mr. BRUNET. In lighting by the people of the country.

The CHAIRMAN. Does that include the fuel item?

Mr. BRUNET. That includes the conservation, what the people individually will save by the reduction of their bills.

The CHAIRMAN. The lighting alone—have you figured the fuel saving?

Mr. BRUNET. That is figured for fuel saving; yes.

Plate D shows curves indicating the time of sunrise and the time of sunset for the average day in each month of the year for Providence, R. I., and there are given the general uses made of the 24 hours by the average man. The effect of the proposed daylight saving plan is indicated by the small squares shown during the months of May, June, July, August, and September. These squares likewise indicate the reductions in the use of artificial light during the five months mentioned.

Plate E shows the division of the 24 hours in a manner similar to plate A, but indicates in a conclusive manner why our artificial lighting bills vary and shows, in addition, the theoretical reduction in such bills, if the daylight saving plan is adopted.

The CHAIRMAN. Have you finished?

Mr. BRUNET. I have finished. I would ask to have included in the record my report to the lighting committee of Providence, R. I.

The CHAIRMAN. That may be printed following your statement.

(The document referred to is here printed in full, as follows:)

DAYLIGHT SAVING.

[Report of R. L. Brunet to lighting committee of city council of Providence, R. I., March, 1917.]

In brief, the essence of the proposed "daylight saving" plan is to take such steps as will induce the public to begin their waking and working day an hour earlier in summer than they do in winter, and it is not intended that the working-day will be any longer than under the present system. In order to accomplish this effectively and efficiently it is proposed that on the Sunday nearest the 1st of May, at 2 o'clock a. m., all clocks will be advanced one hour, so that in the morning the working day will begin exactly one hour earlier than under the existing arrangements. It is further proposed that this plan be followed for five months, until on or about the first Sunday

in October, when, at 2 o'clock a. m., all clocks will be set back one hour and the waking and working conditions for the late fall and winter season will be exactly as they are under the present arrangements.

This proposal offers no complications whatever, provided the plan is made universal and operative at the same time, and unless the change is made simultaneously all over this country the effectiveness of the scheme will be materially lessened, inasmuch as complications will necessarily arise, occasioned by the lack of concord in connection with our standard-time conditions. As, perhaps you are aware, our country is at the present time divided into four time zones, based on certain degrees of longitude west of Greenwich and, although our time zones are clearly defined, for the sake of public convenience the zone lines are more or less flexible so that a city on or near the dividing line is able to select the zone in which they wish to be classed. As a matter of information only, standard time has been legalized in only 12 of the States of the Union, and although the other States operate under standard-time conditions, no legal action of any nature has been taken concerning such arrangements. At this time there is a bill before Congress, commonly called the Borland-Gallinger daylight-saving bill, which places within the powers of the Interstate Commerce Commission the means of making the same effective, and the bill itself should be passed within the very near future, thus conserving to our country and our people those advantages the lack of which can be readily appreciated by a very careful study of the underlying fundamental conditions.

Concisely, the plan holds marked benefits, both of a moral as well as a physical nature and will give to the people at large an increased amount of daylight at a time when such daylight is greatly needed. The plan will also be of a health-giving nature, conserving as it does the human eyesight, the lessening of the possibilities of tuberculosis, decreasing the exhaustion and the strain by working one hour longer in the morning, and will also offer to all workers the advantages of one hour of recreation after the day's work has been completed. These former conditions will unquestionably tend to greater efficiency and will offer other advantages that will be very apparent by a careful study of the matter in question. Other advantages, although of a minor nature as compared with those already enumerated, will be the enormous conservation and economy of our natiural and physical resources by the introduction of the plan as suggested. In other words, our house-lighting bills will be materially reduced, and yet the reduction will not come as a hardship on the lighting companies. This conservation and this economy, in view of the fact that upward of $350,000,000 worth of coal, oil, and gas are wasted annually, should commend themselves to those who believe in the elimination of unnecessary waste.

This proposal is no experiment, as 10 European countries operated under this arrangement during the last summer season, and without exception they have indorsed the movement for the present summer season, with the proviso that the period be extended from five months, in some cases, as long as eight months. To date, no logical opposition has been developed that would condemn the merits of the plan, and not a single disadvantage that is logical can be enumerated.

The plan has received the indorsement of all bodies and organizations that have taken the trouble to investigate its merits, and the unanimous conclusion has been that clock time is absolutely secondary to such a plan that means so much to humanity.

Based on the foregoing, I can recommend the "daylight saving" plan on its own merits, the only proviso being that the same should be made operative universally by a national enactment.

The CHAIRMAN. Mr. F. H. Sibley will now be heard.

STATEMENT OF MR. F. H. SIBLEY, VICE PRESIDENT NATIONAL DAYLIGHT SAVING ASSOCIATION, ROCHESTER, N. Y.

Mr. SIBLEY. Mr. Chairman and gentlemen of the committee, I simply came down here to represent the Rochester Chamber of Commerce. For two years we have agitated this and have been thoroughly in favor of it, and we believe our whole community is thoroughly in favor of this change. I have served as a member of the national committee and have studied the matter, and, as I say, I believe our community is in favor of it.

The CHAIRMAN. The committee will hear Mr. George L. Renaud at this point.

STATEMENT OF MR. GEORGE L. RENAUD, CHAIRMAN DETROIT MORE DAYLIGHT CLUB, DETROIT, MICH.

Mr. RENAUD. Mr. Chairman and gentlemen, I represent a city which has been under eastern time for about two years now, and from our experience over there I believe we can say it absolutely meets with the approval of Detroit. There is a small percentage, possibly, of men who work at night time, a small percentage of men opposed to everything, who do not like the present eastern standard, but a great change has come over the people regarding their attitude. We started about three years ago, when we had an election; we lost every precinct, while last election we won in every precinct three to one in spite of the fact that different railroads were operated on different time.

In working up this plan naturally we brought out all these points, what it means in the way of social benefit of the people, economy, and everything of that kind. Seven or eight years ago I wrote to the National Conservation Association, thinking they should take it up as a national movement. Mr. Pinchot, at that time, told me he did not think it came within their province, although I told the secretary their prospectus stated everything that tended to conserve the health and efficiency of the community was within their scope, and from the remarks here to-day regarding economy and all those things I see now it should have been taken up in the way I always thought it should be, as a national movement.

I do not care to take up the time of the committee, but I should like to read an extract from a letter from our recreation commission, as follows [reading]:

> As a result of this change of time the recreation committee have been making hourly counts on the grounds and have kept the 46 recreation centers under its control open until 9 o'clock at night up to August 3 and until 8.30 after that date.
>
> This after-supper hour proves by far the most popular of any hour of the day. The grounds are thronged with men, women, and children. So far we have emphasized the activity of a twilight league of playground ball, playing regularly on the different grounds after the evening meal. There are 31 teams playing regularly, and the interest has been growing constantly. Frequently crowds of 400 and 500 people congregate to watch the game.
>
> Games of this sort are supplemented by games between fathers and sons in the evening and by outdoor theatricals and concerts. It would be impossible for the grown-ups or the large numbers of the young people in the working groups to participate in any of these activities if it were not light enough for them to use the grounds after the evening meal.
>
> Personally I feel that the more-daylight movement will have an untold influence on the social and moral welfare of the communities is that it will tend to interest individuals of all ages and classes in wholesome outdoor recreation.

The CHAIRMAN. Have you a statement as to how this plan would affect railroad operation?

Mr. RENAUD. Yes; I have letters here.

The CHAIRMAN. I think they should go in the record.

Mr. RENAUD. The committee has power, I see, to change the time zones, and I would suggest that if that were possible, it should be done. If that map were here, if I could take only a moment more to show you what I mean. It is very important to us people out in the West.

This time zone which now extends through here [indicating] should be thrown over toward this western area; then you would include all these States here, all of Michigan, Ohio, and Indiana, and

all these States. I will not ask that that be done, but they have the power to do it. If this plan carries, Detroit would probably stay on eastern time all the year around.

The CHAIRMAN. Do you wish to put those documents in the record touching on the railroad matter?

Mr. RENAUD. I will look them over and see.

The CHAIRMAN. The committee will now hear Mr. Arthur E. Holder.

STATEMENT OF MR. ARTHUR E. HOLDER, REPRESENTING THE AMERICAN FEDERATION OF LABOR, WASHINGTON, D. C.

Mr. HOLDER. Mr. Chairman and gentlemen of the committee, I am not going to consume your time after so many able arguments and statements have already been made to you, but I ask the privilege of reading into the record a resolution passed by the executive council of the American Federation of Labor on January 20 of this year, and it was upon the application for the indorsement of the American Federation of Labor upon the daylight-saving movement.

The first resolution adopted was as follows [reading]:

Resolved, By the executive council of the American Federation of Labor, that we urge the inauguration of the daylight-saving project for the conservation of time and opportunity for greater leisure and open-air exercise for the masses of the people, and we insist that in order that the change may be beneficial it must have its general application throughout the whole United States. We will gratefully receive from and actively give to any groups the fullest support in the attainment of the daylight-saving project so long as it shall be utilized for the purposes herein declared.

I might add a personal word, Mr. Chairman, and with that I will not ask for further time.

I have not heard it mentioned by any of the gentlemen who have preceded me, but this daylight-saving plan will afford an opportunity to many thousands of working people, those who work in offices and in factories and in mills and probably in mines, and on railroads, so that if they feel disposed they will have an opportunity to use an hour in the evening, or more, to till their gardens. If we are going to start an individual conservation scheme, and it looks as though that idea is going to take root, it will be one of the blessings that will grow out of this world difficulty. It will get the people back to the land, if it is only a square rod or two. It will give them an opportunity to know how to raise produce. It is not necessary to elaborate. You know the benefits that will accrue to individuals and groups and we stand for this bill, Mr. Chairman, as it is written, because we believe that it covers all of the essential features.

The CHAIRMAN. We will be glad to hear Mr. Rufus Wilson.

STATEMENT OF MR. RUFUS R. WILSON, SECRETARY NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

Mr. WILSON. Mr. Chairman and gentlemen, our members are largely from the Eastern States. Our association has not engaged yet in this daylight savings plan, but our association is heartily in favor of it. All of our large mill concerns that own land are offering it to their employees for cultivation, and the only time at which they can cultivate that land is after the day's work is done. If this saving

of an hour in the morning is effected they will have time to cultivate their crops in the evening.

We are entirely in favor of this during the summer months and during the war period.

We are interested in the question of conservation of coal. If the Government is going to commandeer the boats that bring our coal to Norfolk we should like to conserve the coal, and I should like the privilege of filing a brief on this matter.

Mr. FILENE. May I ask that Prof. Willson's reports may be included?

The CHAIRMAN. It may appear in the record.

Mr. JACOBY. May I ask that the record show that President Willard, President Trumbull, and President Underwood are all heartily in favor of this proposition?

Senator CALDER. Mr. Tener, president of the National Base Ball Association, expected to be here, but could not come.

Mr. GARLAND. Here is an original letter from Mr. John K. Tener, president of the National League of Professional Base Ball Clubs, which I will ask to have included in the record.

The CHAIRMAN. The letter will be included.

(The letter referred to is here printed in full as follows:)

NATIONAL LEAGUE OF PROFESSIONAL BASE BALL CLUBS,
No. 8 West Fortieth Street, New York, N. Y., September 6, 1916.

Mr. ROBERT GARLAND,
President Chamber of Commerce, Pittsburgh, Pa.

MY DEAR MR. PRESIDENT: Your letter of the 2d instant is received, advising me of the movement undertaken by the Chamber of Commerce of Pittsburgh to move forward the clocks of the Nation one hour.

I am, to-day, and always have been, in favor of this plan, in order that all the people might enjoy just that much more of daylight and God's sunshine. You may record not only my present advocacy of the plan but the hearty cooperation which will be given you by the National League of Professional Base Ball Clubs in bringing about the desired end.

The proposition should recommend itself to all who are interested in welfare work, as well as to those red-blooded Americans who are interested in out-door sports, whether their pleasure be in witnessing contests on the field or participating in them, and who appreciate how necessary it is to the Nation's moral worth that its leisure hours be spent in out-door, healthful recreation.

Very truly, yours,

JOHN K. TENER, *President.*

REPORT OF PROF. ROBERT W. WILLSON, DEPARTMENT OF ASTRONOMY, HARVARD UNIVERSITY.

Before 1883 local time of large cities was that of their neighborhood.

In November, 1883, a change was made which was of great benefit to railways. The time is based on Greenwich time. All our clocks differ from Greenwich time by an exact hour. Eastern time is five hours slower than Greenwich, central six hours, etc. This great improvement was mainly due to W. H. Allen. The great railway cities at once changed to this system, each taking that of the nearest meridian. The clocks of New York, Boston, and Philadelphia were set to eastern time, the meridian of which, five hours from Greenwich, passes nearly through the last-named city. Philadelphia clocks are less than a minute fast of the local mean time of that city. New York clocks are about four minutes slow of New York mean time, and Boston clocks about sixteen minutes slow of Boston mean time.

The zone of eastern time extended as far west as a line from Buffalo through Erie, Pittsburgh, and approximately follows the western boundaries of West Virginia, Virgima, and North Carolina and South Carolina.

Railways running east from these points kept eastern time five hours slow of Greenwich, while those running toward the west ran on central time.

It was, of course, convenient for towns in the neighborhood of this line to keep the same time with each other to avoid confusion, such as used to arise before 1883, when each large city kept its own time, so that a traveling salesman setting his watch at Boston would find it 3 minutes fast at Worcester and 8 minutes at Springfield, 12 in New York, and 16 at Philadelphia. The people of these towns near the line had the choice of the two railway times kept at the station, either of which they might adopt for local use and not be obliged to change their watches when they made journeys not extending more than 1,000 miles (east or west). If they chose eastern time they would find their watches keeping the time of the railway and of the places where they stopped en route at all places as far as Eastport, Me. If they traveled to Chicago or St. Louis or Kansas City they found it no great inconvenience to remember that their watches were exactly one hour fast at all their stops.

It is, however, noteworthy that with few exceptions these people did choose to take eastern time rather than central. It might seem at first thought wise, as the line is just about half way between the two meridians (so that the time to be chosen differs from local time in any case by about a half hour), that the time chosen would be used by the neighboring places with which business relations were closest and to and from which travel was most frequent, but there are indications that this was the case.

It seems not unlikely that the few persons who thought carefully about the subject and who were able to picture and compare the conditions that would arise from either choice realized even then that to set the clock ahead 30 minutes and use eastern time had advantages over setting it back 30 minutes and using that of the meridian of central time lying to the westward.

These people have heretofore been saving a half hour of daylight ever since the establishment of the standard time belts.

The people of towns a little farther west than Buffalo, as, for instance, Cleveland, who had set their clocks back half an hour to keep central time, would naturally compare their own conditions with those at Buffalo—when they were visiting in that city—and realized that they were losing an hour more of afternoon daylight than Buffalo. A few years ago they concluded that for the future they would run on eastern time. More recently Detroit has adopted eastern time and is saving 32 minutes of daylight instead of losing 28.

A study of the time chosen by those cities on the boundary between central and mountain time, who had a like choice between two times furnishes an even more convincing proof of the popularity of daylight saving in the past. It appears from the tables (Exhibit A) [1] that the majority of those towns have chosen to keep central rather than mountain time—that is, to set their clocks ahead as much as 40 minutes, and in some cases, such as Williston and Portal, N. Dak., by more than 50 minutes—rather than back 20 minutes to keep mountain time.

Thus a great many people in the United States have been saving a good deal of daylight for years to suit their habits in time of peace—people who had a free choice to set them back and get their extra daylight in the morning if they had wanted to. The advantage is now more fully realized by every one.

These advantages are now more fully recognized since the application of the summer-time scheme by all the countries at war in Europe.

Advantages in time of peace, they became necessities in a war where every step must be taken to insure success.

Everyone now knows that setting the clock ahead in summer means an hour more of daylight in the afternoon and although that means a later sunrise so few people utilize the morning hour that is sacrificed for anything but sleep that there is little opposition to setting the clock ahead during that period of the year.

The period in which these conditions obtain is shorter in high latitudes than in lower ones and in England all of which lies well north of our northern boundary the period from the beginning of April to the end of September has probably been wisely chosen.

It is certain that for war purposes we should immediately set the clocks ahead, even if we can not now determine when to close the period or even return to present time at all, for it may be necessary for us to utilize every hour of daylight even if a portion of us have to use artificial light in the morning for dressing.

[1] Which was prepared to make these facts plain.

EXHIBIT A.

Times of sunrise and sunset at railway points where standard times change.

EASTERN TIME AND CENTRAL TIME.

Name of town or city.	Latitude.	Longitude.	Standard time used and how much fast or slow of local mean time.	Jan. 1.	Feb. 2.	Mar. 6.	Apr. 7.
	° ′	° ′		Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.
Sault Ste. Marie, Mich.	46 29	84 20	Central, 23m. slow	7.21 4.01	7.00 4.43	6.08 5.30	5.06 6.13
Port Huron, Mich	42 56	82 55	Central, 28m. slow	7.01 4.08	6.45 4.45	5.59 5.26	5.03 6.03
Buffalo, N. Y.	42 52	78 54	Eastern, 16m. fast	7.45 4.51	7.29 5.29	6.44 6.10	5.48 6.47
Detroit, Mich	42 20	83 04	Eastern, 32m. fast	8.01 5.11	7.46 5.48	7.01 6.28	6.06 7.05
Erie, Pa.	42 08	80 05	Eastern, 30m. fast	7.47 5.00	7.33 5.36	6.48 6.15	5.54 6.51
Cleveland, Ohio	41 29	81 39	Eastern, 27m. fast	7.53 5.08	7.39 5.44	6.55 6.23	6 01 6.58
New Castle, Pa.	41 02	80 24	Central, 38m. slow	6.45 5.04	6.31 4.39	5.48 5.17	4.55 5.51
Pittsburgh, Pa.	40 27	80 00	Eastern, 20m. fast	7.42 5.04	7.29 5.39	6.47 6.17	5.55 6.50
Wheeling, W. Va.	40 05	80 45	Eastern, 23m. fast	7.44 5.08	7.31 5.43	6.49 6.19	5.58 6.53
Parkersburg, W. Va.	39 16	81 30	Eastern, 26m. fast	7 44 5 13	7.32 5.47	6.51 6.23	6.01 6.55
Huntington, W. Va.	38 26	82 25	Eastern, 30m. fast	7.45 5.19	7.33 5.52	6.54 6.26	6.05 6.57
Kenova, W. Va.	38 24	82 33	Central, 30m. slow	6.46 4.20	6.35 4.53	5.56 5.28	5.06 5.58
Norton, Va.	36 57	82 36	Eastern, 30m. fast	7 45 5.28	7.35 6.00	6.58 6.33	6.11 7.01
Bristol, Tenn.	36 35	82 10	Eastern, 28m. fast	7.39 5.25	7.30 5.55	6.53 6.27	6.07 6.55
Asheville, N. C.	35 35	82 34	Eastern, 30m. fast	7.39 5.28	7.29 5.58	6.53 6.29	6.08 6.52
Gainesville, Ga.	34 19	83 50	Loc. M., 25m. fast of central.	7.06 5.01	6.58 5.30	6.24 6.00	5.40 6.25
Columbia, S. C.	33 59	81 02	Eastern, 24m. fast	7.29 5.26	7.20 5.55	6.47 6.24	6.04 6.49
Athens, Ga.	33 56	83 25	Eastern, 34m. fast	7.38 5.37	7.31 6.05	6.57 6.34	6.13 6.59
Augusta, Ga.	33 28	81 59	Eastern, 28m. fast	7.31 5.31	7.23 6.00	6.51 6.28	6.08 6.53
Central Junction, Ga.	32 15	81 12	Central, 35m. slow	6.27 4.32	6.19 5.00	5.48 5.27	5.07 5.49

Name of town or city.	May 9.	June 10.	July 12.	Aug. 13.	Sept. 14.	Oct. 16.	Nov. 17.	Dec. 19.
	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.
Sault Ste. Marie, Mich	4.12 6.58	3.44 7.28	3.55 7.20	4.31 6.51	5.13 5.52	5.55 4.50	6.40 4.04	7.15 3.53
Port Huron, Mich.	4.15 6.40	3.51 7.08	4.02 7.10	4.33 6.37	5.09 5.44	5.43 4.48	6.24 4.07	6.55 4.00
Buffalo, N. Y.	4.59 7.24	4.35 7.52	4.46 7.54	5.17 7.20	5.53 6.28	6.27 5.32	7.08 4.50	7.40 4.44
Detroit, Mich	5.19 7.40	4.55 8.09	5.06 81.0	5.37 7.38	6.11 6.46	6.45 5.51	7.24 5.10	7.56 5.03
Erie, Pa.	5.06 7.27	4.43 7.55	4.54 7.56	5.24 7.24	5.59 6.33	6.32 5.39	7.11 4.58	7.42 4.51
Cleveland, Ohio	5.15 7.39	4.52 8.00	5.03 8.01	5.33 7.30	6.06 6.39	6.39 5.49	7.16 5.06	7.47 5.00
New Castle, Pa.	4.09 6.24	3.47 6.52	3.58 6.54	4.27 6.23	4.59 5.33	5.32 4.39	6.09 4.01	6.39 3.54
Pittsburgh, Pa.	5.10 7.23	4.49 7.49	4.59 7.51	5.27 7.21	5.59 6.32	6.31 5.39	7.07 5.01	7.37 4.55
Wheeling, W. Va.	5.13 7.25	4.52 7.51	5.03 7.53	5.31 7.23	6.03 6.35	6.33 5.41	7.09 5.05	7.39 5.00
Parkersburg, W. Va.	5.18 7.25	4.58 7.56	5.08 7.57	5.35 7.24	6.06 6.37	6.35 5.46	7.09 5.11	7.39 5.05
Huntington, W. Va.	5.28 7.27	5.03 7.51	5.13 7.53	5.39 7.25	6.09 6.39	6.37 5.50	7.10 5.15	7.40 5.11
Kenova, W. Va.	4.24 6.28	4.05 6.52	4.15 6.54	4.41 6.27	5.10 5.41	5.38 4.51	6.11 4.17	6.41 4.12
Norton, Va.	5.33 7.28	5.13 7.51	5.23 7.53	5.47 7.28	6.13 6.44	6.40 5.56	7.13 5.23	7.40 5.19
Bristol, Tenn.	5.27 7.23	5.09 7.45	5.19 7.48	5.43 7.22	6.10 6.39	6.35 5.53	7.07 5.19	7.35 5.17
Asheville, N. C.	5.30 7.24	5.12 7.44	5.22 7.47	5.45 7.22	6.11 6.39	6.35 5.53	7.06 5.22	7.37 5.20
Gainesville, Ga.	5.03 6.50	4.46 7.11	4.56 7.14	5.18 6.50	5.43 6.09	6.05 5.25	6.34 4.55	7.01 4.54
Columbia, S. C.	5.28 7.13	5.12 7.44	5.21 7.37	5.43 7.23	6.07 6.33	6.29 5.50	6.57 5.20	7.23 5.19
Athens, Ga.	5.39 7.23	5.21 7.43	5.31 7.47	5.53 7.23	6.17 6.43	6.39 5.59	7.07 5.30	7.33 5.29
Augusta, Ga.	5.32 7.16	5.17 7.46	5.26 7.39	5.47 7.27	6.11 6.37	6.32 5.54	7.00 5.25	7.36 5.23
Central Junction, Ga.	4.33 6.11	4.18 6.31	4.27 6.34	4.47 6.13	5.09 5.34	5.29 4.53	5.55 4.25	6.21 4.34

Times of sunrise and sunset at railway points where standard times change—Continued.

CENTRAL TIME AND MOUNTAIN TIME.

Name of town or city.	Latitude.	Longitude.	Standard time used and how much fast or slow of local mean time.	Jan. 1.	Feb. 2.	Mar. 6.	Apr. 7.
	° ′	° ′					
Portal, N. Dak.	48 59	102 30	Central, 50 m. fast.	8 40 5 00	8 16 5 46	7 20 6 38	6 14 7 27
Williston, N. Dak.	48 09	103 36	Central, 54 m. fast.	8 41 5 08	8 19 5 53	7 25 6 42	6 19 7 30
Mandan, N. Dak.	46 50	100 50	Mountain, 17 m. slow.	7 25 4 03	7 04 4 46	6 12 5 34	5 10 6 18
Mobridge, S. Dak.	45 34	100 22	Central, 41 m. fast.	8 21 5 09	8 02 5 50	7 13 6 35	6 12 7 17
Pierre, S. Dak.	44 23	100 15	Central, 41 m. fast.	8 17 5 13	7 59 5 52	7 11 6 36	6 13 7 15
Rapid City, S. Dak.	44 05	103 15	Mountain, 7 m. slow.	7 26 4 24	7 09 5 05	6 22 5 46	5 24 6 26
Long Pine, Nebr.	42 32	99 40	Central, 39 m. fast.	8 10 5 18	7 54 5 54	7 08 6 35	6 14 7 13
Alliance, Nebr.	42 06	102 50	Mountain, 9 m. slow.	7 20 4 30	7 04 5 06	6 19 5 46	5 25 6 24
North Platte, Nebr.	41 08	100 45	Central, 43 m. fast.	8 11 5 27	7 56 6 02	7 13 6 41	6 20 7 16
Sterling, Colo.	40 38	103 15	Central, 53 m. fast.	8 15 5 35	8 00 6 10	7 18 6 48	6 27 7 12
McCook, Nebr.	40 12	100 40	Central, 43 m. fast.	7 56 5 28	7 51 6 02	7 10 6 40	6 18 7 14
Phillipsburg, Kans.	39 46	99 20	Central, 37 m. fast.	7 59 5 25	7 46 5 59	7 05 6 35	6 15 7 08
Plainville, Kans.	39 14	99 25	Central, 38 m. fast.	7 58 5 26	7 45 6 00	7 05 6 36	6 15 7 08
Ellis, Kans.	38 57	99 40	Central, 39 m. fast.	7 58 5 28	7 45 6 02	7 06 6 37	6 16 7 09
Hoisington, Kans.	38 31	98 45	Central, 35 m. fast.	7 52 5 24	7 40 5 58	7 00 6 32	6 10 7 04
Dodge City, Kans.	37 46	100 00	Central, 40 m. fast.	7 55 5 33	7 44 6 05	7 05 6 38	6 18 7 08
Sixela, N. Mex.	36 24	103 00	Mountain, 8 m. slow.	7 04 4 47	6 54 5 19	6 17 5 51	5 30 6 19
Tucumcari, N. Mex.	35 09	103 46	Mountain, 5 m. slow.	7 03 4 54	6 53 5 24	6 18 5 54	5 34 6 20
Clovis, N. Mex.	34 23	103 12	Mountain, 7 m. slow.	6 58 4 55	6 50 5 24	6 15 5 53	5 33 6 18
El Paso, Tex.	31 59	106 20	Mountain, 5 m. fast.	7 04 5 12	6 57 5 40	6 26 6 06	5 47 6 28
Pecos, Tex.	31 25	103 30	Central, 54 m. fast.	7 43 6 03	7 47 6 30	7 17 6 56	6 37 7 18

Name of town or city.	May 9.	June 10.	July 12.	Aug. 13.	Sept. 14.	Oct. 16.	Nov. 17.	Dec. 19.
	Rise. Set.	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*
Portal, N. Dak.	5. 16 8. 13	4. 44 8. 49	4. 56 8. 49	5. 35 8. 07	6. 23 7. 05	7. 08 5. 59	7. 58 5. 06	8. 36 4. 52
Williston, N. Dak.	5. 22 8. 16	4. 51 8. 50	5. 04 8. 50	5. 41 8. 10	6. 27 7. 08	7. 11 6. 03	8. 00 5. 13	8. 37 5. 00
Mandan, N. Dak.	4. 16 7. 00	3. 46 7. 33	3. 59 7. 34	4. 35 6. 55	5. 17 5. 57	5. 59 4. 54	6. 45 4. 06	7. 20 3. 55
Mobridge, S. Dak.	5. 19 7. 57	4. 58 8. 29	5. 04 8. 30	5. 37 7. 54	6. 18 6. 57	6. 47 5. 56	7. 42 5. 10	8. 16 5. 00
Pierre, S. Dak.	5. 22 7. 55	4. 56 8. 25	5. 07 8. 25	5. 35 7. 51	6. 18 6. 56	6. 56 5. 57	7. 38 5. 14	8. 12 5. 04
Rapid City, S. Dak.	4. 35 7. 04	4. 09 7. 33	4. 20 7. 35	4. 53 7. 00	5. 30 6. 06	6. 07 5. 09	6. 48 4. 26	7. 21 4. 17
Long Pine, Nebr.	5. 25 7. 48	5. 01 8. 16	5. 13 8. 18	5. 44 7. 45	6. 19 6. 55	6. 53 5. 58	7. 33 5. 17	8. 04 5. 10
Alliance, Nebr.	4. 37 6. 58	4. 13 7. 26	4. 24 7. 28	4. 55 6. 56	5. 30 6. 07	6. 04 5. 09	6. 43 4. 28	7. 14 4. 21
North Platte, Nebr.	5. 34 7. 50	5. 10 8. 17	5. 22 8. 19	5. 51 7. 48	6. 25 6. 58	6. 56 6. 04	7. 34 5. 25	8. 05 5. 19
Sterling, Colo.	5. 42 7. 55	5. 20 8. 20	5. 30 8. 23	5. 58 7. 53	6. 31 7. 04	7. 03 6. 11	7. 39 5. 33	8. 09 5. 27
McCook, Nebr.	5. 35 7. 45	5. 12 8. 10	5. 24 8. 14	5. 51 7. 44	6. 23 6. 55	6. 53 6. 03	7. 30 5. 25	8. 00 5. 20
Phillipsburg, Kans.	5. 30 7. 40	5. 08 8. 05	5. 19 8. 07	5. 46 7. 38	6. 18 6. 50	6. 47 5. 58	7. 24 5. 21	7. 54 5. 16
Plainville, Kans.	5. 32 7. 39	5. 11 8. 04	5. 21 8. 06	5. 48 7. 37	6. 19 6. 50	6. 47 6. 00	7. 23 5. 23	7. 53 5. 18
Ellis, Kans.	5. 34 7. 40	5. 13 8. 04	5. 24 8. 06	5. 50 7. 38	6. 20 6. 52	6. 48 6. 01	7. 23 5. 25	7. 52 5. 20
Hoisington, Kans.	5. 29 7. 34	5. 09 7. 59	5. 19 8. 00	5. 45 7. 32	6. 16 6. 47	6. 44 5. 56	7. 17 5. 21	7. 46 5. 16
Dodge City, Kans.	5. 37 7. 37	5. 19 8. 00	5. 28 8. 03	5. 54 7. 36	6. 22 6. 51	6. 47 6. 03	7. 20 5. 28	7. 49 5. 25
Sixela, N. Mex.	4. 51 6. 46	4. 33 7. 09	4. 43 7. 12	5. 07 6. 46	5. 34 6. 03	5. 59 5. 16	6. 30 4. 44	6. 57 4. 40
Tucumcari, N. Mex.	4. 55 6. 46	4. 39 7. 07	4. 49 7. 10	5. 11 6. 46	5. 36 6. 04	6. 00 5. 20	6. 30 4. 47	6. 56 4. 45
Clovis, N. Mex.	4. 55 6. 43	4. 40 7. 04	4. 50 7. 06	5. 11 6. 44	5. 35 6. 03	5. 57 5. 19	6. 25 4. 48	6. 53 4. 46
El Paso, Tex.	5. 13 6. 49	4. 58 7. 09	5. 07 7. 13	5. 27 6. 51	5. 48 6. 13	6. 07 5. 33	6. 33 5. 05	6. 58 5. 05
Pecos, Tex.	6. 03 7. 39	5. 49 7. 59	5. 58 8. 02	6. 17 7. 41	6. 39 7. 03	6. 57 6. 23	7. 22 5. 55	7. 47 5. 55

MOUNTAIN TIME AND PACIFIC TIME.

Name of town or city.	Latitude.	Longitude.	Standard time used and how much fast or slow of local mean time.	Jan. 1.	Feb. 2.	Mar. 6.	Apr. 7.
	° ′	° ′		*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*
Eastport, Idaho.	48 58	116 11	Pacific, 15m. slow.	7. 38 3. 59	7. 14 4. 44	6. 18 5. 35	5. 11 6. 23
Troy, Mont.	48 28	115 56	Mountain, 44m. fast.	8. 33 4. 59	8. 11 5. 43	7. 15 6. 33	6. 09 7. 21
Paradise, Mont.	47 22	114 48	Pacific, 21m. slow.	7. 24 3. 58	7. 04 4. 41	6. 10 5. 30	5. 06 6. 15
Avery, Idaho.	47 05	116 00	Mountain, 44m. fast.	8. 31 5. 06	8. 09 5. 48	7. 16 6. 36	6. 12 7. 21
Huntington, Oreg.	44 21	117 15	Pacific, 11m. slow.	7. 26 4. 16	7. 08 4. 57	6. 19 5. 41	5. 19 6. 23
Caliente, Nev.	37 37	114 29	Mountain, 38m. fast.	7. 51 5. 28	7. 39 6. 01	7. 01 6. 34	6. 13 7. 04
Seligman, Ariz.	35 18	112 56	Mountain, 32m. fast.	7. 38 5. 29	7. 29 5. 59	6. 54 6. 30	6. 09 6. 51
Parker, Ariz.	34 06	114 17	Mountain, 37m. fast.	7. 43 5. 38	7. 34 6. 08	7. 00 6. 37	6. 16 7. 01
Yuma, Ariz.	32 43	114 38	Pacific, 21m. slow.	6. 40 4. 43	6. 33 5. 12	6. 01 5. 35	5. 19 6. 02

Times of sunrise and sunset at railway points where standard times change—Continued.

MOUNTAIN TIME AND PACIFIC TIME—Continued.

Name of town or city.	May 9.	June 10.	July 12.	Aug. 13.	Sept. 14.	Oct. 16.	Nov. 17.	Dec. 19.
	Rise. Set.	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*
Eastport, Idaho.	4. 12 7. 11	3. 41 7. 45	3. 54 7. 46	4. 32 7. 05	5. 19 6. 02	6. 05 4. 55	6. 55 4. 04	7. 33 3. 50
Troy, Mont.	5. 11 7. 07	4. 40 8. 42	4. 53 8. 42	5. 31 8. 02	6. 17 6. 59	7. 02 5. 53	7. 51 5. 03	8. 29 4. 49
Paradise, Mont.	4. 10 6. 59	3. 40 7. 32	3. 52 7. 33	4. 29 6. 55	5. 13 5. 54	5. 56 4. 50	6. 44 4. 01	7. 20 3. 49
Avery, Idaho.	5. 17 8. 05	4. 48 8. 39	4. 59 8. 39	5. 37 8. 00	6. 19 7. 00	7. 01 5. 56	7. 49 5. 08	8. 26 4. 56
Huntington, Oreg.	4. 26 7. 02	4. 00 7. 34	4. 11 7. 34	4. 45 6. 59	5. 25 6. 02	6. 03 5. 03	6. 47 4. 18	6. 21 4. 08
Caliente, Nev.	5. 32 7. 33	5. 13 7. 57	5. 23 7. 57	5. 49 7. 32	6. 18 6. 47	6. 44 5. 59	7. 17 5. 24	7. 45 5. 21
Seligman, Ariz.	5. 31 7. 22	5. 14 7. 44	5. 24 7. 47	5. 47 7. 22	6. 12 6. 40	6. 36 . 55	7. 05 5. 23	7. 33 5. 21
Parker, Ariz.	5. 40 7. 26	5. 24 7. 47	5. 33 7. 50	5. 56 7. 27	6. 20 6. 46	6. 41 6. 02	7. 10 5. 32	7. 36 5. 31
Yuma, Ariz.	4. 44 6. 25	4. 29 6. 45	4. 28 6. 48	4. 59 6. 25	5. 21 5. 47	5. 41 5. 04	6. 08 6. 36	6. 33 6. 35

CENTRAL ZONE.

TABLES SHOWING TIMES OF SUNRISE AND SUNSET IN CITIES OF OVER 20,000 POPULATION.

[To ascertain the operation of the daylight-saving plan, add 1 hour to each hour as printed in the tables below.]

Name of city or town.	Latitude.	Longitude.	Standard time used and how much fast or slow of local mean time.	Jan. 1.	Feb. 2.	Mar. 6.	Apr. 7.
	° ′	° ′		*Rise. Set.*	*Rise. Set.*	*Rise. Set.*	*Rise. Set.*
Superior, Wis.	46 43	91 59	Central, 8 m. fast.	7. 51 4. 31	7. 31 5. 13	6. 39 6. 00	5. 37 6. 43
Green Bay, Wis.	44 31	88 00	Central, 8 m. slow.	7. 28 4. 24	7. 11 5. 01	6. 21 5. 45	5. 23 6. 25
Oshkosh, Wis.	44 9	88 26	Central, 6 m. slow.	7. 29 4. 27	7. 11 5. 05	6. 23 5. 48	5. 24 6. 27
La Crosse, Wis.	43 46	91 10	Central, 5 m. fast.	7. 38 4. 39	7. 21 5. 17	6. 34 5. 59	5. 37 6. 38
Sheboygan, Wis.	43 45	87 41	Central, 9 m. slow.	7. 25 4. 26	7. 09 5. 04	6. 21 5. 46	5. 26 6. 25
Bay City, Mich.	43 37	83 53	Central, 24 m. slow.	7. 08 4. 10	6. 52 4. 48	6. 05 5. 30	5. 07 6. 09
Saginaw, Mich.	43 26	83 55	Central, 24 m. slow.	7. 07 4. 11	6. 51 4. 49	6. 05 5. 31	5. 08 6. 09
Muskegon, Mich.	43 12	86 17	Central, 15 m. slow.	7. 17 4. 21	7. 00 4. 58	6. 14 5. 40	5. 18 6. 18
Madison, Wis.	43 3	89 18	Central, 3 m. slow.	7. 29 4. 34	7. 13 5. 11	6. 28 5. 53	5. 30 6. 30
Milwaukee, Wis.	43 3	87 57	Central, 10 m. slow.	7. 24 4. 29	7. 08 5. 06	6. 21 5. 47	5. 25 6. 27
Flint, Mich.	43 1	83 41	Central, 25 m. slow.	7. 06 4. 10	6. 50 4. 48	6. 04 5. 30	5. 07 6. 08
Grand Rapids, Mich.	42 58	85 41	Central, 19 m. slow.	7. 13 4. 19	6. 57 4. 57	6. 11 5. 38	5. 16 6. 15
Racine, Wis.	42 48	87 48	Central, 9 m. slow.	7. 23 4. 30	7. 07 5. 07	6. 20 5. 47	5. 25 6. 25
Lansing, Mich.	42 45	84 38	Central, 22 m. slow.	7. 08 4. 15	6. 52 4. 53	6. 06 5. 33	5. 11 6. 10
Kenosha, Wis.	42 33	87 49	Central, 9 m. slow.	7. 22 4. 31	7. 06 5. 07	6. 21 5. 47	5. 25 6. 25
Kalamazoo, Mich.	42 20	85 37	Central, 18 m. slow.	7. 12 4. 21	6. 57 4. 58	6. 11 5. 39	5. 17 6. 15
Battle Creek, Mich.	42 20	85 10	Central, 19 m. slow.	7. 10 4. 20	6. 55 4. 57	6. 10 5. 37	5. 15 6. 14
Jackson, Mich.	42 16	84 26	Central, 22 m. slow.	7. 06 4. 16	6. 51 4. 53	6. 06 5. 33	5. 11 6. 10
Rockford, Ill.	42 14	89 00	Central, 4 m. slow.	7. 25 4. 35	7. 10 5. 12	6. 25 5. 52	5. 30 6. 28
Evanston, Ill.	42 5	87 42	Central, 9 m. slow.	7. 13 4. 36	6. 59 5. 10	6. 17 5. 47	5. 26 6. 21
Elgin, Ill.	42 2	88 18	Central, 7 m. slow.	7. 21 4. 32	7. 05 5. 08	6. 21 5. 49	5. 26 6. 24
Chicago, Ill.	41 53	87 40	Central, 9 m. slow.	7. 18 4. 31	7. 03 5. 07	6. 19 5. 47	5. 25 6. 22
Aurora, Ill.	41 48	88 17	Central, 7 m. slow.	7. 20 4. 33	7. 05 5. 08	6. 21 5. 49	5. 27 6. 24
Toledo, Ohio.	41 39	83 33	Central, 26 m. slow.	7. 01 4. 15	6. 47 4. 51	6. 02 5. 29	5. 09 6. 06
Hammond, Ind.	41 38	87 31	Central, 10 m. slow.	7. 18 4. 29	7. 01 5. 07	6. 17 5. 45	5. 23 6. 21
South Bend, Ind.	41 36	86 14	Central, 15 m. slow.	7. 11 4. 25	6. 57 5. 02	6. 13 5. 41	5. 19 6. 16
Moline, Ill.	41 30	90 30	Central, 2 m. fast.	7. 29 4. 43	7. 15 5. 19	6. 30 5. 58	5. 36 6. 34
Joliet, Ill.	41 30	88 3	Central, 8 m. slow.	7. 19 4. 34	7. 05 5. 10	6. 21 5. 49	5. 27 6. 24
Cleveland, Ohio.	41 29	81 39	Eastern, 27 m. fast.	7. 53 5. 08	7. 39 5. 44	6. 55 6. 23	6. 01 6. 58
Rock Island, Ill.	41 28	90 32	Central, 2 m. fast.	7. 29 4. 43	7. 15 5. 19	6. 30 5. 58	5. 36 6. 34
Lorain, Ohio.	41 28	82 11	Central, 31 m. slow.	6. 54 4. 10	6. 40 4. 46	5. 57 5. 25	5. 03 6. 00
Akron, Ohio.	41 7	81 37	Central, 34 m. slow.	6. 51 4. 08	6. 37 4. 43	5. 53 5. 22	5. 00 5. 57
Youngstown, Ohio.	41 7	80 42	Central, 37 m. slow.	6. 47 4. 05	6. 34 4. 41	5. 50 5. 19	4. 57 5. 53
Fort Wayne, Ind.	41 2	85 10	Central, 20 m. slow.	7. 05 4. 23	6. 51 4. 59	6. 08 5. 37	5. 15 6. 11
Galesburg, Ill.	40 54	90 18	Central, 1 m. fast.	7. 34 4. 44	7. 11 5. 19	6. 27 5. 57	5. 35 6. 31
Canton, Ohio.	40 50	81 27	Central, 34 m. slow.	6. 49 4. 09	6. 35 4. 43	5. 52 5. 21	5. 00 5. 55
Mansfield, Ohio.	40 46	82 29	Central, 30 m. slow.	6. 54 4. 13	6. 40 4. 48	5. 57 5. 26	5. 04 6. 00
Lima, Ohio.	40 46	84 7	Central, 24 m. slow.	7. 01 4. 20	6. 47 4. 56	6. 04 5. 33	5. 11 6. 07
Peoria, Ill.	40 41	89 35	Central, 2 m. slow.	7. 22 4. 42	7. 08 5. 17	6. 25 5. 55	5. 33 6. 29
East Liverpool, Ohio.	40 40	80 31	Central, 38 m. slow.	6. 46 6. 06	6. 33 4. 41	5. 49 5. 19	4. 57 5. 53
Bloomington, Ill.	40 30	88 58	Central, 4 m. slow.	7. 18 4. 39	7. 05 5. 14	6. 22 5. 52	5. 30 6. 25
Steubenville, Ohio.	40 23	80 41	Central, 37 m. slow.	6. 46 4. 08	6. 33 4. 43	5. 51 5. 20	4. 59 5. 54
Muncie, Ind.	40 10	85 19	Central, 19 m. slow.	7. 04 4. 27	6. 51 5. 01	6. 08 5. 38	5. 17 6. 12
Danville, Ill.	40 6	87 38	Central, 10 m. slow.	7. 13 4. 36	6. 59 5. 10	6. 17 5. 47	5. 26 6. 21
Anderson, Ind.	40 4	85 34	Central, 18 m. slow.	7. 05 4. 29	6. 52 5. 03	6. 10 5. 39	5. 18 6. 13
Newark, Ohio.	40 4	82 23	Central, 30 m. slow.	6. 51 4. 15	6. 38 4. 49	5. 56 5. 28	5. 04 5. 59
Zanesville, Ohio.	39 57	81 59	Central, 32 m. slow.	6. 49 4. 13	6. 36 4. 48	5. 55 5. 25	5. 03 5. 57
Columbus, Ohio.	39 56	82 56	Central, 28 slow.	6. 53 4. 18	6. 41 4. 53	5. 59 5. 29	5. 07 6. 02
Springfield, Ohio.	39 53	83 45	Central, 25 m. slow.	6. 56 4. 21	6. 43 4. 55	6. 01 5. 32	5. 01 6. 05
Quincy, Ill.	39 51	91 20	Central, 5 m. fast.	7. 26 4. 51	7. 13 5. 25	6. 31 6. 02	5. 41 6. 35
Decatur, Ill.	39 51	88 55	Central, 4 m. slow.	7. 17 4. 41	7. 03 5. 15	6. 22 5. 53	5. 31 6. 25

Times of sunrise and sunset at railway points where standard times change—Continued.

CENTRAL ZONE—Continued.

TABLES SHOWING TIME OF SUNRISE AND SUNSET IN CITIES OF OVER 20,000 POPULATION—continued.

Name of city or town.	Latitude.	Longitude.	Standard time used and how much fast or slow of local mean time.	Jan. 1.	Feb. 2.	Mar. 6.	Apr. 7.
	° ′	° ′		Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.
Richmond, Ind.	39 49	84 52	Central, 21 m. slow	7.01 4.36	6.48 5.00	6.07 5.37	5.15 6.09
Springfield, Ill.	39 47	89 35	Central, 2 slow	7.20 4.45	6.07 5.19	6.25 5.56	5.35 6.28
Indianapolis, Ind.	39 46	86 6	Central, 16 m. slow	7.05 4.31	6.53 5.05	6.11 5.41	5.20 6.14
Dayton, Ohio	39 41	84 14	Central, 23 slow	6.57 4.23	6.45 4.57	6.03 5.33	5.12 6.06
Terre Haute, Ind.	39 24	87 27	Central, 10 slow	7.09 4.37	6.57 5.11	6.16 5.47	5.25 6.19
Hamilton, Ohio	39 20	84 12	Central, 23 slow	6.57 4.25	6.45 4.29	6.03 5.33	5.13 6.07
Cincinnati, Ohio	39 3	84 24	Central, 22 slow	6.55 4.26	6.44 5.00	6.04 5.35	5.14 6.06
Newport, Ky.	39 1	84 25	Central, 22 slow	6.55 4.26	6.44 5.00	6.04 5.35	5.14 6.06
Covington, Ky.	38 49	84 28	Central, 22 slow	6.57 4.27	6.45 5.00	6.05 5.36	5.15 6.07
Portsmouth, Ohio	38 41	82 53	Central, 28 slow	6.49 4.20	6.37 4.54	5.57 5.29	5.08 6.00
East St. Louis, Ill.	38 37	90 12	Central, 1 fast	7.18 4.50	7.06 5.23	6.26 5.58	5.37 6.29
Belleville, Ill.	38 27	89 57	Central, same as L.M.T.	7.16 4.50	7.05 5.23	6.25 5.57	5.36 6.28
New Albany, Ind.	38 18	85 46	Central, 17 m. slow	7.00 4.35	6.49 5.07	6.09 5.42	5.20 6.12
Louisville, Ky.	38 13	85 40	Central, 17 slow	6.59 4.33	6.48 5.06	6.09 5.41	5.19 6.11
Frankfort, Ky.	38 9	84 52	Central, 21 m. slow	6.56 4.30	6.44 5.03	6.05 5.37	5.16 6.08
Evansville, Ind.	38 0	87 30	Central, 10 slow	7.06 4.41	6.55 5.14	6.15 5.48	5.27 6.18
Lexington, Ky.	38 0	84 31	Central, 22 slow	6.54 4.30	6.43 5.02	6.04 5.36	5.15 6.06
Paducah, Ky.	37 7	88 41	Central, 5 slow	7.08 4.49	6.57 5.21	6.20 5.54	5.33 6.25
Bristol, Tenn.	36 35	82 10	Eastern, 29 fast	7.39 5.25	7.30 5.55	6.53 6.27	6.07 6.55
Nashville, Tenn.	36 9	86 48	Central, 13 slow	6.58 4.44	6.49 5.15	6.12 5.47	5.26 6.14
Knoxville, Tenn.	35 57	83 57	Central, 24 m. slow	6.45 4.33	6.36 5.03	6.00 5.35	5.14 6.02
Memphis, Tenn.	35 9	90 00	Central, same as L.M.T.	7.08 5.00	6.59 5.30	6.24 6.00	5.40 6.26
Chattanooga, Tenn.	35 0	85 21	Central, 19 slow	6.49 4.41	6.41 5.11	6.01 5.41	5.21 6.07
Gainesville, Ga.	34 19	83 50	L. M. T., 25 m. fast of Central.	6.41 4.36	6.33 5.05	5.59 5.35	5.15 6.00
Athens, Ga.	33 56	83 25	Eastern, 34 fast	7.38 5.37	7.31 6.05	6.57 6.34	6.13 6.59
Macon, Ga.	33 46	83 36	Central, 26 slow	6.38 4.38	6.30 5.06	5.57 5.34	5.14 5.59
Atlanta, Ga.	33 42	84 26	Central, 22 slow	6.41 4.40	6.34 5.09	6.00 5.38	5.18 6.02
Birmingham, Ala.	33 28	86 40	Central, 13 m. slow	6.51 4.51	6.44 5.19	6.10 5.46	5.28 6.12
Augusta, Ga.	33 28	81 59	Eastern, 28 fast	7.31 5.31	7.23 6.00	6.51 6.28	6.08 6.53
Columbus, Ga.	32 28	84 58	Central, 20 slow	6.41 4.46	6.34 5.14	6.02 5.39	5.21 6.04
Vicksburg, Miss.	32 22	90 47	Central, 3 m. fast	7.04 5.09	6.57 5.37	6.25 6.04	5.44 6.27
Meridian, Miss.	32 22	88 26	Central, 6 slow	6.56 5.00	6.49 5.29	6.17 5.55	5.35 6.19
Montgomery, Ala.	32 21	86 23	Central, 14 slow	6.46 4.52	6.40 5.20	6.08 5.42	5.26 6.09
Central Junction, Ga.	32 15	81 12	Central, 50 slow	6.27 4.22	6.19 5.00	5.48 5.27	5.07 5.49
Jackson, Miss.	32 15	90 11	Central, 1 fast	7.03 5.07	6.56 5.35	6.23 6.02	5.42 6.25
Savannah, Ga.	32 3	81 7	Central, 36 slow	6.26 4.32	6.19 5.00	5.48 5.26	5.07 5.49
Mobile, Ala.	30 43	88 3	Central, 8 slow	6.50 5.03	6.44 5.30	6.14 5.55	5.35 6.15
Tallahassee, Fla.	30 26	84 18	Central, 23 slow	6.33 4.48	6.28 5.15	5.59 5.39	5.19 5.59
Pensacola, Fla.	30 22	87 10	Central, 11 slow	6.44 4.59	6.39 5.26	6.10 5.50	5.32 6.11
Jacksonville, Fla.	30 20	81 40	Central, 33 slow	6.23 4.38	61.8 5.05	5.48 5.29	5.10 5.50
Tampa, Fla.	27 58	82 25	Central, 30 slow	6.20 4.47	6.17 5.13	5.51 5.33	5.14 5.50
Miami, Fla.	25 45	80 13	Central, 39 slow	6.07 4.40	6.04 5.04	6.39 5.34	5.06 5.40
Key West, Fla.	24 34	81 50	Central, 33 m. slow	6.11 4.50	6.09 5.11	5.46 5.32	5.13 5.45

Name of city or town.	May 9.	June 10.	July 12.	Aug. 13.	Sept. 14.	Oct. 16.	Nov. 17.	Dec. 19.
	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.
Superior, Wis.	4.42 7.26	4.14 7.59	4.25 8.00	5.01 7.22	5.43 6.23	6.25 5.21	7.11 4.33	7.46 4.22
Green Bay, Wis.	4.31 7.05	4.05 7.36	4.16 7.37	4.50 7.02	5.28 6.00	6.06 5.07	6.49 4.28	7.24 4.13
Oshkosh, Wis.	4.35 7.05	4.11 7.36	4.22 7.37	4.54 7.03	5.32 6.08	6.08 5.10	6.50 4.27	7.23 4.19
La Crosse, Wis.	4.47 7.16	4.22 7.45	4.33 7.46	5.05 7.13	5.43 6.19	6.18 5.21	7.00 4.38	7.33 4.29
Sheboygan, Wis.	4.34 7.03	4.10 7.32	4.21 7.34	4.53 7.00	5.29 6.06	6.06 5.08	6.46 4.26	7.21 4.17
Bay City, Mich.	4.19 6.47	3.58 7.15	4.05 7.17	4.37 6.43	5.13 5.49	5.49 4.52	6.30 4.10	7.03 4.02
Saginaw, Mich.	4.19 6.46	3.55 7.15	4.06 7.17	4.37 6.43	5.13 5.49	5.49 4.53	6.30 4.11	7.03 4.03
Muskegon, Mich.	4.29 6.55	4.05 7.25	4.15 7.25	4.47 6.53	5.23 5.59	5.58 5.02	6.39 4.20	7.13 4.13
Madison, Wis.	4.41 7.07	4.17 7.36	4.29 7.37	4.59 7.04	5.36 6.11	6.11 5.15	6.51 4.33	7.24 4.25
Milwaukee, Wis.	4.37 7.03	4.13 7.31	4.23 7.33	4.55 6.59	5.31 6.06	6.06 5.10	6.46 4.28	7.19 4.20
Flint, Mich.	4.19 6.45	3.55 7.13	4.05 7.15	4.37 6.42	5.12 5.48	5.48 4.52	6.29 4.10	7.01 4.02
Grand Rapids, Mich.	4.27 6.52	4.03 7.20	4.14 7.21	4.55 6.49	5.21 5.56	5.56 5.00	6.36 4.19	7.09 4.11
Racine, Wis.	4.37 7.01	4.14 7.30	4.25 7.31	4.55 6.59	5.31 6.06	6.05 5.10	6.45 4.29	7.17 4.21
Lansing, Mich.	4.23 6.47	3.59 7.15	4.10 7.16	4.41 6.44	5.16 5.51	5.51 4.56	6.30 4.15	7.03 5.07
Kenosha, Wis.	4.37 7.01	4.14 7.29	4.25 7.31	4.55 6.57	5.31 6.06	6.05 5.10	6.45 4.29	7.17 4.22
Kalamazoo, Mich.	4.29 6.51	4.06 7.19	7.16 7.20	4.46 6.49	5.21 5.57	5.55 5.01	6.35 4.20	7.07 4.13
Battle Creek, Mich.	4.27 6.49	4.04 7.17	4.15 7.19	4.45 6.47	5.19 5.55	5.53 4.59	6.33 4.19	7.05 4.12
Jackson, Mich.	4.23 6.46	4.00 7.12	4.10 7.15	4.41 6.43	5.16 5.51	5.50 4.56	6.29 4.15	7.01 4.07
Rockford, Ill.	4.43 7.04	4.26 7.32	4.30 7.33	5.00 7.02	5.35 6.09	6.09 5.15	6.48 4.34	7.20 4.27
Evanston, Ill.	4.41 6.53	4.20 7.19	4.30 7.22	4.55 6.56	5.30 6.04	6.04 5.09	6.43 4.39	7.14 4.22
Elgin, Ill.	4.39 7.00	4.15 7.28	4.26 7.30	4.57 6.57	5.32 6.06	6.05 5.11	6.44 4.31	7.15 4.24
Chicago, Ill.	4.37 6.57	4.15 7.25	4.25 7.26	4.55 6.55	5.29 6.04	6.03 5.09	6.41 4.29	7.13 4.23
Aurora, Ill.	4.39 6.59	4.17 7.26	4.27 7.29	4.57 6.57	5.32 6.05	6.05 5.11	6.43 4.32	7.15 4.24

Times of sunrise and sunset at railway points where standard times change—Continued.

CENTRAL ZONE—Continued.

TABLES SHOWING TIME OF SUNRISE AND SUNSET IN CITIES OF 20,000 POPULATION—continued.

Name of city or town.	May 9.	June 10.	July 12.	Aug. 13.	Sept. 14.	Oct. 16.	Nov. 17.	Dec. 19.
	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.	Rise. Set.
Toledo, Ohio.	4.22 6.40	4.00 7.07	4.10 7.09	4.40 6.38	5.13 5.47	5.46 4.53	6.24 4.14	6.65 4.07
Hammond, Ind.	4.37 6.56	4.14 7.23	4.25 7.25	4.55 6.53	5.29 6.02	6.01 5.08	6.39 4.29	7.11 4.22
South Bend, Ind.	4.32 6.51	4.10 7.18	4.20 7.20	5.50 6.49	5.24 5.58	5.57 5.03	6.35 6.24	7.06 4.17
Moline, Ill.	4.59 7.08	4.27 7.35	4.37 7.37	5.07 7.06	5.45 6.15	6.14 5.21	6.52 4.42	7.24 4.35
Joliet, Ill.	4.41 6.59	4.18 7.26	4.29 7.27	4.58 6.56	5.32 6.06	6.05 5.12	6.33 4.33	7.14 4.25
Cleveland, Ohio.	5.15 7.32	4.52 8.00	5.03 8.01	5.32 7.30	6.06 6.39	6.39 5.46	7.16 5.06	7.47 5.00
Rock Island, Ill.	4.59 7.08	4.27 7.35	4.37 7.37	5.07 7.06	5.45 6.15	6.14 5.21	6.52 4.42	7.24 4.35
Lorain, Ohio.	4.17 6.34	3.54 7.02	4.05 7.03	4.34 6.32	5.08 5.42	5.40 4.48	6.18 4.08	6.49 4.03
Akron, Ohio.	4.14 6.30	3.52 6.57	4.03 6.59	4.31 6.29	5.05 5.39	5.37 4.45	6.14 4.06	6.45 4.00
Youngstown, Ohio.	4.11 6.27	3.49 6.54	3.59 6.56	4.29 6.25	5.02 5.35	5.34 4.42	6.11 4.03	6.42 3.57
Fort Wayne, Ind.	4.29 6.45	4.08 7.11	4.18 7.14	4.47 6.43	5.20 5.53	5.52 5.00	6.29 4.21	7.00 4.15
Galesburg, Ill.	4.50 7.05	4.27 7.31	4.38 7.33	5.07 7.03	5.40 6.13	6.11 5.20	6.48 4.42	7.19 4.35
Canton, Ohio.	4.14 6.29	3.53 6.55	4.03 6.57	4.31 6.27	5.05 5.37	5.35 4.45	6.13 4.06	6.43 4.00
Mansfield, Ohio.	4.17 6.33	3.57 7.00	4.07 7.02	4.36 6.32	5.09 5.43	5.40 4.49	6.17 4.11	6.48 4.05
Lima, Ohio.	4.26 6.41	4.05 7.08	4.15 7.09	4.44 6.39	5.17 5.49	5.47 4.57	6.25 4.18	6.55 4.13
Peoria, Ill.	4.48 7.02	4.26 7.29	4.36 7.31	5.05 7.00	5.38 6.11	6.09 5.18	6.45 4.40	7.17 4.34
East Liverpool, Ohio.	4.12 6.27	3.50 6.53	4.01 6.54	4.29 6.25	5.03 5.35	5.33 4.42	6.09 4.05	6.41 3.58
Bloomington, Ill.	4.45 6.59	4.24 7.25	4.33 7.27	5.02 6.57	5.35 6.07	6.07 5.15	6.43 4.37	7.13 4.31
Steubenville, Ohio.	4.14 6.27	3.52 6.53	4.02 6.55	4.31 6.25	5.03 5.35	5.34 4.43	6.09 4.05	6.41 3.59
Muncie, Ind.	4.32 6.45	4.11 7.10	4.22 7.12	4.49 6.43	5.21 5.53	5.52 5.02	6.29 4.24	6.59 4.18
Danville, Ill.	4.41 6.53	4.20 7.19	4.30 7.22	4.59 6.52	5.30 6.03	6.01 5.11	6.37 4.33	7.07 4.27
Anderson, Ind.	4.34 6.46	4.13 7.11	4.23 7.14	4.51 6.44	5.23 5.55	5.53 5.03	6.30 4.26	6.60 4.20
Newark, Ohio.	4.20 6.31	3.59 6.58	4.09 6.59	4.37 6.29	5.09 5.41	5.39 4.49	6.15 4.13	6.45 4.07
Zanesville, Ohio.	4.19 6.29	3.58 6.56	4.08 6.57	4.36 6.28	5.08 5.40	5.37 4.48	6.13 4.11	6.43 4.06
Columbus, Ohio.	4.24 6.34	4.03 7.00	4.13 7.02	4.41 6.33	5.12 5.44	5.42 4.53	6.18 4.15	6.48 4.41
Springfield, Ohio.	4.26 6.37	4.05 7.02	4.15 7.04	4.43 6.37	5.05 5.47	5.45 4.55	6.21 4.18	6.51 4.13
Quincy, Ill.	4.57 7.07	4.35 7.33	4.45 7.34	5.13 7.05	5.45 6.17	6.15 5.25	6.51 4.48	7.21 4.43
Decatur, Ill.	4.47 6.57	4.25 7.23	4.35 7.25	5.04 6.55	5.35 6.07	6.05 5.15	6.41 4.39	7.11 4.33
Richmond, Ind.	4.32 6.41	4.11 7.07	4.21 7.09	4.49 6.40	5.19 5.51	5.49 5.00	6.25 4.23	6.55 4.18
Springfield, Ill.	4.50 7.01	4.29 7.27	4.39 7.29	5.07 6.59	5.39 6.11	6.09 5.19	6.45 4.41	7.15 4.36
Indianapolis, Ind.	4.36 6.46	4.15 7.11	4.26 7.14	4.53 6.45	5.25 5.57	5.54 5.05	6.30 4.28	7.00 4.23
Dayton, Ohio.	4.28 6.38	4.07 6.04	4.17 7.06	4.46 6.37	5.17 5.49	5.46 4.57	6.22 4.20	6.52 4.15
Terre Haute, Ind.	4.41 6.51	4.21 7.16	4.31 7.18	4.59 6.49	5.29 6.01	5.59 5.11	6.34 4.34	7.04 4.29
Hamilton, Ohio.	4.30 6.35	4.07 7.05	4.17 7.07	4.47 6.37	5.18 6.49	5.46 4.58	6.23 4.21	6.51 4.17
Cincinnati, Ohio.	4.31 6.38	4.12 7.04	4.21 7.06	4.48 6.36	5.18 5.49	5.47 4.59	6.21 4.23	6.51 4.19
Newport, Ky.	4.31 6.38	4.12 7.04	4.21 7.06	4.48 6.36	5.18 5.49	5.47 4.59	6.21 4.23	6.51 4.19
Covington, Ky.	4.32 6.38	4.12 7.04	4.22 7.06	4.49 6.37	5.19 5.50	5.47 5.00	6.23 4.24	6.52 4.19
Portsmouth, Ohio.	4.23 6.30	4.05 6.56	4.15 6.58	4.42 6.29	5.12 5.43	5.39 4.53	6.14 4.17	6.43 4.13
East St. Louis, Ill.	4.55 6.59	4.35 7.24	4.45 7.26	5.11 6.58	5.41 6.12	6.19 5.22	6.54 4.43	7.21 4.42
Belleville, Ill.	4.55 6.58	4.35 7.23	4.44 7.25	5.11 6.57	5.40 6.11	6.08 5.21	6.42 4.47	7.11 4.42
New Albany, Ind.	4.38 6.42	4.19 7.06	4.29 7.08	4.55 6.41	5.25 5.55	5.53 5.05	6.26 4.31	6.55 4.26
Louisville, Ky.	4.37 6.41	4.18 7.05	4.28 7.07	4.54 6.40	5.23 5.54	5.51 5.05	6.25 4.30	6.53 4.25
Frankfort, Ky.	4.34 6.37	4.15 7.02	4.25 7.04	4.51 6.37	5.20 5.51	5.47 5.01	6.21 4.26	6.50 4.22
Evansville, Ind.	4.55 6.48	4.26 7.11	4.36 7.14	5.02 6.47	5.31 6.01	5.59 5.13	6.31 4.38	7.01 4.33
Lexington, Ky.	4.34 6.36	4.15 7.00	4.24 7.03	4.50 6.35	5.90 5.49	5.46 5.01	6.19 4.26	6.49 4.21
Paducah, Ky.	4.53 6.51	4.34 7.15	4.44 7.17	5.08 6.51	5.37 6.06	6.03 5.18	6.35 4.45	7.03 4.41
Bristol, Tenn.	5.27 7.23	5.09 7.45	5.19 7.48	5.43 7.22	6.10 6.39	6.35 5.53	7.07 5.19	7.35 5.17
Nashville, Tenn.	4.47 6.42	4.29 7.04	4.39 7.07	5.03 6.41	5.29 5.58	5.55 5.12	6.25 4.39	6.53 4.36
Knoxville, Tenn.	4.35 6.33	4.18 6.51	4.27 6.53	4.51 6.29	5.17 5.45	5.41 4.59	6.12 4.27	6.39 4.25
Memphis, Tenn.	5.02 6.53	4.45 7.14	4.55 7.17	5.17 6.52	5.43 6.10	6.06 5.25	6.36 4.54	7.03 4.52
Chattanooga, Tenn.	4.43 6.33	4.25 6.55	4.35 6.57	4.58 6.33	5.23 5.51	5.47 5.06	6.17 4.33	6.44 4.33
Gainesville, Ga.	4.38 6.25	4.21 6.46	4.31 6.49	4.53 6.25	5.18 5.44	5.40 5.00	6.09 4.30	6.36 4.29
Athens, Ga.	5.38 7.23	5.21 7.43	5.31 7.47	5.53 7.23	6.17 6.43	6.39 5.59	7.07 5.30	7.33 5.29
Macon, Ga.	4.38 6.23	4.22 6.44	4.32 6.47	4.53 6.24	5.17 5.44	5.38 5.00	6.07 4.31	6.33 4.30
Atlanta, Ga.	4.42 6.26	4.26 6.47	4.36 6.50	4.57 6.27	5.21 5.47	5.42 5.04	6.11 4.34	6.37 4.33
Birmingham, Ala.	4.52 6.36	4.36 6.57	4.45 6.59	5.07 6.37	5.31 5.56	5.52 5.23	6.19 4.45	6.45 4.43
Augusta, Ga.	5.32 7.16	5.17 7.46	5.26 7.39	5.47 7.27	6.11 6.37	6.32 5.54	7.00 5.25	7.36 5.23
Columbus, Ga.	4.46 6.26	4.31 6.46	4.40 6.50	5.01 6.27	5.24 5.48	5.43 5.07	6.10 4.39	6.35 4.38
Vicksburg, Miss.	5.09 6.49	4.55 7.09	5.04 7.12	5.25 6.50	5.47 6.18	6.06 5.30	6.33 5.02	6.58 5.01
Meridian, Miss.	5.01 6.41	4.46 7.01	4.55 7.04	5.15 6.42	5.38 6.03	5.58 5.21	6.25 4.54	6.58 4.53
Montgomery, Ala.	4.52 6.32	4.34 6.55	4.46 6.55	5.07 6.33	5.29 5.54	5.48 5.13	6.15 4.45	6.41 4.44
Central Junction, Ga.	4.33 6.11	4.18 6.31	4.27 6.34	4.47 6.13	5.09 5.34	5.29 4.53	5.55 4.25	6.21 4.24
Jackson, Miss.	5.07 6.47	4.53 7.08	5.02 7.11	5.22 6.48	5.45 6.10	6.05 5.28	6.31 5.00	6.57 4.59
Savannah, Ga.	4.32 6.11	4.18 6.31	4.27 6.34	4.47 6.12	5.09 5.34	5.28 4.52	5.54 4.25	6.20 4.24
Mobile, Ala.	5.02 6.36	4.44 6.55	4.58 6.58	5.17 6.38	5.37 6.01	5.55 5.22	6.20 4.55	6.44 4.55
Tallahassee, Fla.	4.47 6.20	4.34 6.39	4.43 6.42	5.02 6.21	5.22 5.45	5.39 5.06	6.03 4.40	6.28 4.40
Pensacola, Fla.	4.59 6.32	4.46 6.49	4.55 6.52	5.14 6.33	5.33 5.56	5.50 5.17	6.14 4.52	6.39 4.52
Jacksonville, Fla.	4.38 6.10	4.24 6.28	4.33 6.31	4.52 6.11	5.12 5.35	5.29 4.56	5.53 4.30	6.18 4.30
Tampa, Fla.	4.45 6.08	4.33 6.26	4.41 6.28	4.58 6.10	5.15 5.37	5.30 5.01	5.51 4.37	6.15 4.39
Miami, Fla.	4.38 5.56	4.27 6.11	4.35 6.15	4.52 5.58	5.07 5.26	5.20 4.52	5.39 4.31	6.01 4.34
Key West, Fla.	4.47 6.00	4.37 6.15	4.45 6.19	5.00 6.03	5.13 5.33	5.25 4.59	5.44 4.40	6.05 4.43

The CHAIRMAN. I think, unless some one else wishes to be heard now, that we may conclude the hearings for the present.

We are very glad to have heard you and appreciate the promptness with which you have presented this matter and the readiness with which you have conserved our time as well as your own. The committee will now adjourn until Thursday, May 10, 1917.

(Thereupon at 12 o'clock m., the committee adjourned to meet at 2 o'clock p. m. on Thursday, May 10, 1917.

DAYLIGHT SAVING AND STANDARD TIME FOR THE UNITED STATES.

THURSDAY, MAY 10, 1917.

UNITED STATES SENATE,
COMMITTEE ON INTERSTATE COMMERCE,
Washington, D. C.

The subcommittee met, pursuant to adjournment, at 2 o'clock p. m., in the committee room, Capitol, Senator Joseph T. Robinson presiding.

Present: Senator Kellogg.

Senator Calder was also present.

The subcommittee resumed the consideration of the bill S. 1854, to save daylight and to provide standard time for the United States.

The CHAIRMAN. The committee will come to order.

At the previous hearing a number of gentlemen appeared in advocacy of the bill. I have received several hundred letters and telegrams, the greater number of them from persons who favored the legislation, many of them coming from representatives of boards of trade and chambers of commerce. Of course I understand that the telegrams and letters were prompted or suggested, and really I do not understand or comprehend the necessity for them. They would burden the record and I will not have them incorporated in it. I regret that I shall not have the opportunity of making an acknowledgement of them, as my time is consumed in matters of more importance to the public than the answering of prompted or suggested telegrams and letters.

The hearing to-day is at the request of Mr. Faulkner, who represents certain railroads, and I understand Mr. Stewart is present and ready to be heard. The committee will be glad to hear any suggestions that you care to make regarding this bill, Mr. Stewart.

Mr. FAULKNER. Mr. Stewart is chairman of the committee on transportation of the American Railway Association, and the work and duties of that committee being more especially than anything else in reference to rules and regulations for the movement of trains.

STATEMENT OF MR. D. C. STEWART, SUPERINTENDENT OF PASSENGER TRANSPORTATION, PENNSYLVANIA RAILROAD, PHILADELPHIA, PA.

Mr. FAULKNER. Will you first state to the committee the difficulty you had in getting here?

The CHAIRMAN. That does not make any difference, Mr. Faulkner. He need not state that. Let him state what he has to upon this bill. The committee is not concerned about his difficulty in getting here.

Mr. FAULKNER. I simply wanted to show the condition of these men.

The CHAIRMAN. We are all busy, Mr. Faulkner—Senators are busy, and that is not an issue here.

Mr. STEWART. Mr. Chairman, I think, with your permission, I can narrow down very quickly to one point all I want to speak about.

As we understand the bill, the zones are to be practically on the lines of the present zones——

The CHAIRMAN. That is our understanding.

Mr. STEWART. And if the bill becomes a law the Interstate Commerce Commission will specifically designate the line, so that instead of following the exact lines of longitude they will take in junctions and such like, to permit economical and convenient operation. So I do not think it is necessary to say anything about that.

The only other point in the bill, as I see it, which would affect the railroads, is the moving of watches and clocks one hour ahead or one hour back, and I might just say that on the railroads of the East, or any double-track railroad, or three or four track railroad, I do not see that that is objectionable. I think it might be just as well to say here that if the question should be asked as to how they managed this in Europe, I would say it applied where the conditions over there correspond very closely to such railroads as I have mentioned, namely, those with more than one track.

In this country, in the South and West, we have single-line railroads thousands of miles long, and these railroads are operated under train rules, train orders, time-tables, and clocks and watches.

Under the rules and the time-table one train is superior to another running in the opposite direction on the same track and safety depends upon observance of the rules and the time-tables by both trains. Watches are essential to a compliance with the time-table.

We are here to-day primarily to tell you gentlemen just what would occur on those single-track railroads—not just because we want to object, but just to state what will occur. These railroads will have trains on the road at the time the change takes place, some superior and having rights over the others and the inferior trains must give the superior trains a clear track. When, by law, watches are changed back or earlier by one hour and the superior passenger trains become automatically one hour ahead of schedule, and have no status at all on the railroad, a dangerous situation is created.

Senator KELLOGG. That is only twice a year.

Mr. STEWART. That would be twice a year, but that is plenty often enough. Every time it occurs it is a danger spot. An inferior train running against a superior train would have to clear that train. The question would come up, with an extra train on the road which would have to clear a schedule train in either direction, because both are superior. The question arises, How would that be accomplished and what should be the instructions to those men, and how will they understand the situation? That is where the danger comes in. If there should be one man on the railroad or on any railroad who misinterprets his instructions, or if he makes a mistake in changing his watch—if he wants to change it an hour and he does not change it quite an hour, or if he wants to change it forward and inadvertently changes it back, there is not nothing that stands between that man and a wreck.

The CHAIRMAN. The same thing might occur if his watch did not keep time, or if he failed to set his watch when it stopped, or failed to wind it, or anything of that sort.

Mr. STEWART. That is an element of danger which would be eliminated if there was a way of doing it. But you are not inviting a further danger by that condition.

Senator KELLOGG. Can not the railroads arrange to make that change first at a time of the day when the fewest number of trains are running, say at midnight?

Mr. STEWART. They can. The fewest——

Senator KELLOGG. Would be running at midnight.

Mr. STEWART. For instance, I am assuming from the bill that it would be the same hour all over the United States. That might be a time when a great many trains are on some railroads.

Senator KELLOGG. But the bill does not provide that.

Senator CALDER. There is nothing compulsory about it. The railroad company could fix their time at midnight or 6 the day before or 6 the next day. There is no penalty.

Mr. FAULKNER. The bill says 2 o'clock.

Senator CALDER. Nothing could prevent you refusing to change the time.

Mr. STEWART. That would still leave the condition which we have described. Two o'clock in the morning would probably be the most favorable time.

Senator KELLOGG. This bill does not force you to do it—that is, one particular hour—and if it does, it can be changed.

The CHAIRMAN. It does not force it at all. It simply provides a statutory standard time, but there is no penalty attached to it and no means of enforcing it. Suppose the railroad says, "We will pay no attention to that"?

Mr. STEWART. Well, Mr. Chairman, we are law abiding people.

The CHAIRMAN. As a matter of fact, they would not do that, of course. It would be very inconvenient to you if you undertook not to observe it and everybody else was observing it. The confusion would be great.

Senator KELLOGG. You say there is no objection to it at all by the double track or three or four track railroads?

Mr. STEWART. Nothing that can not be overcome safely.

The CHAIRMAN. Your objection, if I understand, is that it tends to create confusion which might result in accident?

Mr. STEWART. Absolutely.

Mr. FAULKNER. That is the only ground.

The CHAIRMAN. On two days during the year.

Mr. STEWART. Two days during the year.

The CHAIRMAN. When the changes are made.

Mr. STEWART. Yes, sir.

Senator KELLOGG. It appeared here that there would be great benefit to a large number of employers—in fact, practically all the employers of labor—to have in those long summer months an hour early in the morning and an hour at night; that it would benefit not only the employer of labor or manufacturer but the employee, and so far as I have been able to obtain information, nobody has contradicted that. May I add to that that there would also be a large saving in cities in the matter of lighting contracts, etc. There was

no statement to the contrary that I heard, or that I have been told of outside. What have you to say about that?

Mr. STEWART. That might all be true, but I could probably answer you fully if I should ask you a question. I do not know whether it is permissable or not.

Senator KELLOGG. Certainly.

Mr. STEWART. Did you have any expression from a person who was acquainted with railroad operation?

Senator KELLOGG. I was not talking about railroads at all. I was talking entirely about the industrial employees outside of railroads. I have been told by railroad men that it was a good thing, but I did not go into it. The hearing the other day, I think, was only industrial, was it not?

Senator CALDER. Yes. The statement was made here that Mr. Willard, of the Baltimore & Ohio, favored it.

Mr. FAULKNER. It is strange I have not heard it if he has.

Senator CALDER. He was present at the meeting of the Advisory Committee of the National Defense Council and voted for it.

Senator KELLOGG. Yes, it was so stated.

The CHAIRMAN. Yes, here is a memorandum to that effect now, and also a memorandum as to the presence of Mr. Trumbull and President Underwood, who are, as you well know, prominent railroad men.

Mr. FAULKNER. I represent all those companies, and I have no information of that.

The CHAIRMAN. I did not mean to provoke an argument about the matter, and Mr. Stewart has stated in a word the only objection that I have found to this bill. It is demanded by nearly all the industrial concerns in the United States I referred a while ago to in the communications I have had. I think my mail has been increased by hundreds of letters and telegrams each day, and I have already stated that I know most of those were prompted; that is, someone has suggested the telegrams or has had the letters written. But, in addition to that, the subject has been studied by the heads and officers of the boards of trade and chambers of commerce throughout the United States, and they presented some figures here to show the probable economies that would result if this measure were adopted. They claim that in the gas and electric light bills it will result in a saving of something like $40,000,000 a year to the people of the United States if it is enacted and observed; and in addition to that it will afford opportunity for many persons to engage in small farming and horticultural activities, and gardening, and it will mean a very material increase in the food supply, and in addition to that, that it will add to the comfort and convenience and pleasure and happiness of the people who work, and that, all told, the experiences in European countries where it hs been put into operation have so cordially approved it that it ought to be passed now by Congress, notwithstanding the fact that we are dealing almost exclusively with what may be called emergency and war measures.

Mr. STEWART. Is it true that Germany abolished it after two or three months' trial?

The CHAIRMAN. Not according to our hearings here. The statement was made here that no country that had ever tried it had ever abolished it.

Mr. STEWART. I have no evidence in my possession from which I could make the statement, but I understand that Germany abolished it after two or three months' trial. I do not know whether that is true or not. Mr. Chairman, may I ask if what you had from President Underwood was directly from him?

The CHAIRMAN. No; it was a statement by some witness.

Mr. STEWART. I happen to have a letter in my correspondence here from Mr. Underwood to Mr. Atterbury, which I think is now only fair to refer to. It was not intended to be presented in evidence, but this is his statement to Mr. Atterbury. He concludes by saying:

> I am fully in accord with the views expressed in the inclosures, but could never consent to any change except it be made permanent, and I do not see how a single-track line could consider for a moment the proposed annual change.

Senator CALDER. Who is that from?

Mr. STEWART. That is from Mr. F. D. Underwood. With the permission of the committee I would like to read the resolution of the American Railway Association itself on the subject.

The CHAIRMAN. We will be glad to have it.

Mr. FAULKNER. It bears on another subject too.

Mr. STEWART. I will simply read the resolution [reading]:

> *Resolved*, That in accordance with the recommendation of the committee on standard time the special committee on relations of railway operation to legislation be advised that any legislation excepting that which provides for a permanent change and which recognizes the present standard time zones shall be opposed on behalf of the railways.

Senator CALDER. When was that adopted?

Mr. STEWART. It was adopted—this letter was written February 21, 1917. The subject was considered by the executive committee at its meeting as the executive committee of the American Railway Association, which meeting was held February 16, 1917, in accordance with the recommendation of the committee on standard time.

The CHAIRMAN. Here is a statement by Prof. Jacoby, who is an astronomer, and who was at one time assistant to the president of Columbia University. He stated before this committee as follows:

> We feel now that that which before was desirable has become infinitely desirable, and instead of being an academic question it is a thing which 10 or 12 nations of Europe have put into effect and after using it a year have decided to continue.
>
> Senator KELLOGG. Have all the nations of western Europe got it?
>
> Prof. JACOBY. Yes, sir.
>
> Senator KELLOGG. Great Britain and France?
>
> Prof. JACOBY. Great Britain, France, and Germany, and Germany was first.
>
> Mr. MARKS. Eleven countries, England, France, Germany, Austria-Hungary, Italy, Sweden, Denmark, Norway, and Holland. In addition to those countries, this year Portugal, Australia, Iceland, and Bermuda have adopted it.
>
> Prof. JACOBY. Germany was first and England followed soon.

And then the statement is continued. Now, with respect to the attitude of Messrs. Trumbill and Underwood, I think perhaps I should say that I have no authority from them to represent their attitude here, and was merely referring to something that was said at the hearing the other day. I do not know how either of those gentlemen view the question, and we will be very glad, if you do, to have you present their view of it.

Senator KELLOGG. I suggest that Mr. Faulkner be given that record in order that he may read what they say.

The CHAIRMAN. I think it would really be interesting to you, Mr. Faulkner.

Senator KELLOGG. I would like to have the railroads consider carefully whether the benefit to the public would be such that they would advocate it rather than oppose it.

Mr. FAULKNER. We thought we ought to present the dangers and then if the committee determined to pass the bill, of course they would assume the responsibility.

Mr. CHAIRMAN. I should say that as to the question of when the bill should go into effect, we thought it should be twenty or thirty days from the time it became a law—whatever you gentlemen thought was the proper time to give full notice to the country and its people in which to make the change. We thought perhaps it could not pass before the first of June under the condition of rush that you have here and the crowded calendars, and in view of the pending vital legislation to the country, and then the question came up—and that was one thing the witness was going on to state, namely, as to whether or not this change, where it causes a great deal of risk to safety—whether it ought to be made twice in two or three months, as would be the effect if it came now. For example, if you made it go into effect the first Sunday in July or the last Sunday of June, then you would have to change it again the last Sunday in September under the bill. Now, that would be three months' work on it, and then to change back; whereas the change back would bring it exactly to what it is to-day, and whether it ought not to be made to go into effect the first Sunday in April, as you have it in this bill, if it should pass in time.

Senator CALDER. Of course, we do not think—at least, I do not think—it is a change back. It is simply turning the clock ahead. You run right on with your same time-tables.

Mr. FAULKNER. You would have the same time-tables, but at the same time there is a change there. All the changes in watches have got to be made by all the men on the road, but I do not think it is worth regulating it for two months or one and a half months in the summer. Let it go into operation as this is now the time. It should occur from September to April. It should go into effect the first Sunday of April, as you have it in the bill, and, if possible, not have any change until September. Our people have thought that there ought to be only one change, but that, of course, is a matter that you gentlemen must decide—whether you must change back for the winter and change up for the summer.

Senator CALDER. You gentlemen have referred to the danger of risk of accident. There has been no complaint in England, and their problems are as great as ours.

Mr. FAULKNER. It was the double-track roads. He has stated that very frankly to the committee.

The CHAIRMAN. He said it would not be of any inconvenience to the double track, but that it would to the single track, and has demonstrated to my satisfaction that it will be inconvenient to them and attended by some danger.

Senator CALDER. There must be some single-track roads in Europe.

Mr. STEWART. I wish you would not say "inconvenience." We do not care about that. We have never mentioned that. I would not want to mention that; I would not want to have you understand for a minute that I am here on the subject of "inconvenience." It is absolutely for safety, and nothing else. It is not the cost or convenience, or anything of that kind.

The CHAIRMAN. I see that it will be of some inconvenience.

Mr. STEWART. We would never appear here on that account.

Senator KELLOGG. And some risk.

Mr. FAULKNER. There would be some inconvenience, but inconvenience would not stand in the way where the safe management of railroads is concerned.

Senator CALDER. I can only see a very minimum of danger.

Mr. FAULKNER. How many trains are on the road at that hour of the night, say 2 o'clock a. m.?

Mr. STEWART. This report is not separated as between single and double track railroads, but a record has been taken on all. On all the railroads it would be necessary to change the clocks and watches to the number of 1,698,818, and to get them all changed without confusion would be rather difficult.

Senator CALDER. That many clocks and watches?

Mr. STEWART. On the railroads; and on all the railroads of the United States at 2 o'clock in the morning the record made shows, including single and double track railroads and four-track railroads, there would be approximately 1,000 passenger trains and 5,000 freight trains out on the roads when the change would be made.

Senator KELLOGG. Mr. Chairman, I would like to have Mr. Stewart read over this record and add any statement or letters or telegrams that he cares to. I shall have to leave the committee, but I would like to have him do that, because I shall read the record with care.

The CHAIRMAN. You may do that, Mr. Stewart. You may incorporate any letters or resolutions that you have, and if you want to call special attention to any of them we will be glad to have you do it.

Mr. STEWART. I have read you the resolution. I do not have a record of the discussion on the resolution. I have the resolution itself, which I have already put into the record, and I also have made a statement in connection with the zones and one with regard to the number of watches and clocks and the effect on operation of trains. I do not have anything else.

Senator CALDER. May I ask you a question, Mr. Stewart? The American Railway Association has always fixed the standard of time for the zones, has it not? There is no governmental function that has ever taken that up?

Mr. STEWART. Those zones were adopted by the railroads in 1883, and they have existed as they are until the present time.

Senator CALDER. You have made some changes of stations, have you not, and there are some cities where they have changed from one zone to another?

Mr. STEWART. The railroads have made no changes that I know of. The city of Cleveland as a city, did.

Senator CALDER. And Detroit also?

Mr. STEWART. I think so. I would not state it as a fact, but I have no knowledge of the railroads having changed it.

Senator CALDER. So the only authority in the country for the present zones or changes in the zones are the railroad companies?

Mr. STEWART. The railroads adopted—that is, the railroads formulated the scheme and put it into effect, I understand. It can

be verified easily enough—but the Government at that time, in some way or other, placed its approval on the matter.

Senator CALDER. I have looked carefully through the records to find out whether the Government has ever approved it, but can not find it.

Mr. STEWART. There were 83 standards of time in the United States until 1883. I do not know when they commenced, but up to that time there were 83 standards of time. Mr. W. F. Allen, an old railroad man, who was for a long time general secretary of the American Railway Association, and who died about a year ago, was known as the father of the present time system, and he and the gentlemen who were working with him on the question, worked out these zones, and independently of any Government or State action, they were adopted by the railroads. But I heard Mr. Allen say on one occasion, on the twenty-fifth anniversary of the present time system, in a speech in Chicago, that the Government had afterwards approved the system.

Senator CALDER. Well, perhaps it may be in existence in some department of the Government.

Mr. STEWART. I do not know in what form it was.

Senator CALDER. There has never been any legislation on the subject, has there?

Mr. STEWART. I do not think there has been any legislation on the subject.

Senator CALDER. The effect of this bill would be to take from the railroad companies the right to effect zones, and give it to the Interstate Commerce Commission.

Mr. STEWART. I do not believe the railroads would want the right to change them, if they are left as they now are.

The CHAIRMAN. Mr. Stewart, we are very glad to have had you appear before us, and we appreciate your explanation of the difficulties that arise concerning this matter in connection with the railroad service. If you have nothing further to state, the committee will adjourn.

Mr. STEWART. Mr. Chairman, I want to say in conclusion that we are neither pessimists nor obstructionists in this matter. We just wanted, in as plain language as we could, to place before you gentlemen our view of it. I thank you very much.

The CHAIRMAN. Before we adjourn I would like to place in the record a copy of a hearing before a subcommittee of the Committee on Interstate Commerce, United States Senate, Sixty-fourth Congress, on Senate joint resolution 135, and also a report of the "Summer time committee" to the British Parliament.

(The hearing referred to by the chairman is here printed in full, as follows:)

STANDARDIZATION OF TIME.

HEARING BEFORE THE SUBCOMMITTEE OF THE COMMITTEE ON INTERSTATE COMMERCE, UNITED STATES SENATE, SIXTY-FOURTH CONGRESS, FIRST SESSION, ON S. J. RES. 135, A JOINT RESOLUTION TO CREATE A COMMISSION TO INVESTIGATE THE STANDARDIZATION OF TIME IN THE UNITED STATES AND ITS TERRITORIAL POSSESSIONS, MAY 26, 1916.

UNITED STATES SENATE,
SUBCOMMITTEE ON INTERSTATE COMMERCE,
Washington, D. C.

The subcommittee met at 3 o'clock p. m., pursuant to call, Senator Jas. Hamilton Lewis presiding.

Present: Senators Lewis (chairman), Newlands, and Poindexter.

The subcommittee met for the purpose of considering Senate joint resolution 135, as follows:

"Joint resolution to create a commission to investigate the standardization of time in the United States and its Territorial possessions.

"*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled*, That the President of the United States be, and he is hereby, authorized to create a commission for the purpose of setting a standard time or times for the United States and its Territorial possessions.

"SEC. 2. That said commission shall comprise the Superintendent of the United States Naval Observatory, the Chief of the United States Weather Bureau of the Department of Agriculture, one representative of labor, one representative of industry, and one representative of all transportation agencies.

"SEC. 3. That said commission is hereby empowered and directed to make a thorough investigation of all questions involved in the standardization of time in the United States and its Territorial possessions, particularly with reference to economic and labor conditions, hours of employment, and kindred questions. The report of said commission shall be submitted to Congress not later than January first, nineteen hundred and seventeen.

"SEC. 4. That the sum of $5,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to defray the expenses of the investigation herein authorized."

The CHAIRMAN. The committee has been called to consider Senate joint resolution 135, which is before you.

We will first hear Mr. John Callan O'Laughlin.

STATEMENT OF MR. JOHN CALLAN O'LAUGHLIN, WASHINGTON CORRESPONDENT CHICAGO HERALD.

The CHAIRMAN. Mr. O'Laughlin, you are interested in the passage of joint resolution No. 135 to create a commission to investigate the standardization of time in the United States and its Territorial possessions. The committee will be glad to get your views regarding the desirability of this commission and the prospective value of its work.

Mr. O'LAUGHLIN. The purpose of the resolution is to make a thorough investigation of the entire time situation in the United States, not only for the purpose of fixing a standard of time reckoning in this country, but for the purpose of taking advantage of a lesson which has been taught by the European war.

As a result of the pressure of circumstances Germany, France, England, and some of the neutral countries have arranged for advancing the clock in order that the largest advantage may be taken of daylight. It has been found as a result of the experience in Germany particularly that by advancing the clock an hour in the morning the people getting their usual sleep are able to go to work to better advantage, and under the conditions, of course, they can work longer hours, and the result is naturally a greater output. Then again, as a result of the use of daylight for working hours the operatives are bound, particularly in the morning hours, to be more efficient. Their eyesight is better and general health conditions are better. Again, by using the daylight it has been found in Germany that a great saving in fuel which is required for lighting purposes has been effected. Of course in a neutral country like the United States by advancing the clock the result would be that the operatives would get off at an earlier hour in the afternoon, which would enable them to have more time for recreation during daylight, which, of course, would be beneficial to their health, and would also be advantageous to the industries, since they would not use the fuel that would be required for illuminating purposes at night.

Now, the Government of the United States has never interfered in the matter of time in the United States. It is quite true that a great many years ago there was a change by action of Congress in the time meridian. For many years the meridian was that of Greenwich, England, but because of the difficulty of putting the time based on that meridian in the United States it was deemed advisable to establish a time meridian in the United States, and the time meridian in Washington was selected.

Now, the railroads, unfortunately, had a great deal of difficulty in adjusting their schedules to the time because of the great longitudinal area of the United States. So in 1882, as a result of a suggestion made by a man named Dowd, of Saratoga Springs, N. Y., the railway association established time zones in the United States. As you know, there are four of those time zones—one the eastern, one the central, one mountain, which you know, Mr. Chairman, is your section, and the other, of course, is the Pacific coast time.

The difficulty about this action of the railroads is this: Naturally the railroads desire to save in every possible way. In your section, for example, there are four transcontinental railways. Those four roads have different points, which it is believed from the map are on the same line, where they ship their train crews, and their time is based to those four points. But the map is different from what the actual longitude really is, the result being that there is a zigzag showing a difference of 100 miles, and the difference naturally is 10 or 15 minutes. So that from the railroad point of view it is absolutely desirable that there should be a standardization of time by the Government of the United States in order that there would not be that difference in time.

Now, that difference in time, as small as it may seem, is important to all the industries of the United States. It is important in the way that they ought to know precisely the time the various legal questions which depend upon exact time are to happen.

Now, it is desirable consequently from that point of view to have a standardization of time in the United States.

Congress authorized participation in an international conference in 1882 to fix upon a meridian proper to be employed as a common zero of longitude and standard of time reckoning throughout the world.

Nothing ever came of that, but one of our delegates was a man named W. F. Allen, who was secretary of the railway time convention. He said this [reading]:

"The establishment of a prime meridian has from force of circumstance become of practical importance and certainly in the interests particularly of those responsible for the safety of life and property. These interests bear an important relation to the commerce of the world. Exactness of time reckoning is an imperative necessity in the conduct of business."

I think every business man will agree with that statement.

It is obvious that the United States, having the greatest extent of continuous longitudinal area of any country traversed by railway, telegraph, and postal lines, should take the initiative in a movement of such great importance to science and the world's commerce as the common prime meridian. It was suggested in 1882 that a national standard of time should be established by Congress for our ports of entry and for our coast cities. This would accomplish what is desired in connection with the regulation of time in the United States and might be incorporated in any international system to be adopted.

So that, by our standardization of time, the United States ought to take the initiative in a great movement for the establishment of an international time meridian which would be of the highest importance, of course, to navigators.

Chiefly for the convenience of railroads in the United States a standard of time was established by mutual agreement in 1883, in accordance with a suggestion first made by Charles F. Dowd, of Saratoga Springs, N. Y., by which trains are run and local time regulated. The United States, beginning at its extreme eastern limit and extending to the Pacific coast, is divided into four time sections—eastern, central, mountain, and Pacific. The eastern section, the time of which is that of the seventy-fifth meridian, lies between the Atlantic Ocean and an irregular line drawn from Detroit to Charleston, S. C. The central, the time of which is that of the ninetieth meridian, includes all between the last-named line and an irregular line from Bismark, N. Dak., to the mouth of the Rio Grande. The mountain, the time of which is that of the one hundred and fifth meridian, includes all between the last-named line and the western boundary of Montana, Idaho, Utah, and Arizona. The Pacific, the time of which is that of the one hundred and twentieth meridian, includes all between the last-named line and the Pacific coast. The difference in time between adjoining sections is one hour. Thus when it is 12 o'clock noon in New York City, eastern time, it is 11 o'clock a. m., central time, at Chicago; 10 o'clock a. m. at Denver, mountain time; and at San Francisco 9 o'clock a. m., Pacific time.

The true local time of any place is slower or faster than the standard time as the place is east or west of the time meridian. Thus the true local time at Boston is 16 minutes faster than the eastern standard time, while at Buffalo it is 16 minutes slower, the seventy-fifth meridian being one-half way between Boston and Buffalo. Local time and standard time agree at Denver, as Denver is on the one hundred and fifth meridian, that of the mountain section.

I desire to call your attention to the many obvious advantages that would accrue from the adoption by the United States of America of what is generally known as the daylight-saving plan recently put into effect in England, Germany, and other countries of Europe—the setting forward of the clock one hour in the early summer and the setting back when the darker days come.

The shortening of the workday from the farmer's "sun to sun" to the artisan's 10 hours or 8 hours has not proceeded logically. It has been at both ends of the sunlight. A little thought shows that by shortening at only one end the total of sunlight could be more profitably used. If the workday started earlier it could end earlier, and people would have more continuous sunlight for recreation and for tasks outside of their gainful employments. A better adjustment of hours of labor to those of sunlight would also save on lunch bills both at home and in the shop or office.

Objections to the plan have been based on the possibility that in communities where it might be adopted it would throw industries and trades out of gear with other communities and cause confusion by having two "times." The situation, therefore, in my judgment, calls not for local or even State but for national action. It calls, in fact, simply for practical recognition of when the sun rises and sets.

Now, parenthetically, I may say in that connection that of course Congress has the power to act in this matter. Congress, under the interstate-commerce clause of the Constitution, of course, has the right to make any adjustment of time or to do anything else in connection with interstate commerce it desires. You know that better than I do, so I need not go into that question.

There is an argument for such an adjustment beside the economic one. That is the health argument, to which I refer later on.

With the examples that Europe is setting of practically universal recognition of the benefits of such a readjustment, it is believed by students of the question that it is time for America to recognize them and take action to secure them.

BENEFITS THAT WILL ACCRUE IN RECREATIONAL WAY.

Few people plan or have a chance for recreation before beginning the day's work. The general rule is to look forward to the end of the day for such diversions as are available. Few probably would object to starting work an hour earlier if they were recompensed by concluding their day's work an hour earlier.

That extra daylight hour would permit many open-air diversions which are not within the opportunity of men and women who, even in the long hours of spring and summer, have not enough time between the end of the work and the closing of day to encourage them to the undertaking.

It would give to the worker, whether in office or factory, in town or country, an hour more daylight at a period in the 24 hours when it will be of the greatest physical benefit to himself and his family.

It would mean more time for play at the conclusion of the day's work, more hours for the parks, more hours for the woods, more hours for the family reunion. It would reduce to a minimum the plaint that life offers nothing but work and sleep.

A concrete example of one hour of daylight was furnished yesterday in the city in which your honorable committee is sitting. The baseball club which represents the National Capital and the one which represents Chicago battled 14 innings to a tie. Darkness probably prevented Griffith's young men from adding a much needed ball game to their winning column. With an extra hour of sunlight Washington might have been leading the league again, as the Sox had a slim chance of getting a run from Walter Johnson.

It is not on record whether the fans at Cleveland or Detroit swung those cities in line for more sunlight, but neither is it on record that a game has been called on account of darkness in those cities since they appropriated a bigger place in the sun.

Another class belonging to the army of recreation which would welcome the change is the golf contingent. Seldom is a tourney terminated, when a big field is entered, until the rear guard of the starters is in need of guides to the nineteenth tee. In national tourneys the elimination round is seldom finished for lack of an extra hour of daylight, as two or three pairs are usually lost in the gathering gloom.

Track meets are another form of recreation which will be vitally affected, not to mention rowing races and tennis tourneys. The custom now is to start big track games shortly after noon in order to have the last event run off before darkness sets in. An extra hour of daylight and all this would be obviated.

BENEFITS IN HEALTH GIVING.

All health experts agree that people would be better off, as a rule, for getting up earlier and going to bed earlier—for sleeping more during the hours of darkness and being out of doors more during the sunlight hours.

More people are coming to understand the value of outdoor life and are devoting themselves to its cultivation. Outdoor life makes for better health and better work, and the additional daylight hour "off" in the evening, made possible by the earlier start of the day, gives the opportunity for this self-improvement.

It means the recovery of several hundred of hours yearly of daylight that are lost in the early morning hours before arising and using them at the end of the day for health-giving exercise and outdoor living.

FROM THE ECONOMICAL STANDPOINT.

It would mean a saving to individuals in the cost of coal and artificial light, for more of their evening would be daylight. In England it is estimated that the summer saving in lighting will amount to $12,500,000.

Except possibly in ocean shipping and in some of the sciences, business is regulated by the clock. Whether the clock is pushed one hour forward or one hour backward would make little difference, such is the habit to note time by what the clock indicates.

While the plan is considered generally as humanitarian, it really is economic to a large degree, for it is expected to furnish more satisfied workers, men and women of better health, of more strength and energy, workers who will do their tasks more cheerfully and more efficiently because they know a larger share of the daylight hours will be left to them for their own uses.

Industrial life would be deprived of some of its drudgery if an additional daylight hour were given workers in which to achieve something for themselves.

As a rule, greater efficiency is possible during the hours before the sun reaches its meridian. Under the proposed time change less of the working day would be during the hours when the enervating influence of the sun is greatest.

It would facilitate international business by providing sufficient time to exchange cablegrams during the business hours of the same day.

MEETING POSSIBLE OPPOSITION.

Action by Congress making a uniform advance of one hour in time in the summer period for the entire country would surmount the main obstacle to the change. The railroads are almost a unit in opposing the plan for any one section, their principal argument being the confusion it would cause in their schedules. A uniform advance for the whole country probably would necessitate little change in schedule.

EXPERIENCE IN DETROIT.

Detroit, acting independently, pushed its clocks ahead an hour a few years ago. Recently Dr. George L. Renaud, of that city, discussing the effects of the change, said:

"It has come to stay in Detroit. The people like it too well ever to go back. I would like to take you through our large department stores, so you could ask the clerks how they like it. You could visit the factories and ask the workmen how they like it. You could ask the rank and file and all lines of endeavor and you would realize the desirability of the change could be no longer ignored.

"The adoption of standard time was a progressive step, but in its adoption convenience to the traveling public alone was the chief consideration. While this was important and was along the lines of progress at the time, with our present knowledge, it is no longer sufficient and must make way for other ideas. To-day we are more impressed with certain vital truths than we formerly were; truths which are directly connected with the time question. We know now and appreciate more than we did, even a few years ago, the importance of fresh air and out-of-door living.

"Gov. Ferris, of Michigan, states it admirably when he says, in speaking of the white plague: 'If, however, it is important that tuberculous patients have an abundance of pure air and sunshine, systematic out-of-door exercise, nourishing food, and pleasant surroundings, how immensely important that all who are not so afflicted have the benefit of these agencies in order that we may eventually have a people who are immune.'

"If these facts are so important, it is equally important that our social structure should be regulated under a time system whereby we can take advantage instead of being deprived of the same agencies. That is why the time question does not down. It carries within itself altruistic humanitarian ideas for the advancement of the general happiness and contentment of the community, the increase in the health of its citizens, and thereby plays an important rôle in the conservation of human life."

REPORT BY CHICAGO ASSOCIATION OF COMMERCE.

After a thorough investigation of the subject a special committee of the Chicago Association of Commerce recently made the following report, which was adopted by the association:

"Your special committee on change of times beg to report that in its opinion the proposal so to arrange our standard time as to bring more daylight into the end of the day is a suggestion of greatest importance and is well worthy any expense or effort to effect its accomplishment.

"The advantages to be derived by advancing our standard time one hour are far-reaching, benefitting not only the enjoyment and health of the people, but conserving the natural resources of our country.

"The disadvantages, which should perhaps more properly be termed inconveniences, provided the change could be accomplished without disturbance of schedules based on the uniform standard time adopted in 1883, and now in general use and well understood, are so trifling as to be hardly worthy of consideration.

"This question is not new. It has been discussed in various parts of the country from Spokane, Wash., to Boston, Mass., and as far south as Florida. Some cities, notably Cleveland, Ohio, have arbitrarily made their standard time one hour ahead of the uniform basis, and with the exception of the inconvenience arising from the confusion of being one hour ahead of the general railroad time, we believe are well pleased with the change.

"Union labor officials have shown their personal interest in the proposal, believing it would make for the health, happiness, and welfare of the workingman.

"We believe this change should be made throughout the entire country and not locally, as local changes would tend to upset the now satisfactory and well-established standard time, upon which all railroad-time-tables and schedules are based, and this plan would cause no railroad time-table changes."

I submit herewith the text of the daylight-saving bill adopted by the British Parliament, which, as you will observe, takes cognizance of the difficulties which might arise in connection with time expressions in laws, ordinances, deeds, contracts, and other legal documents:

"LOCAL TIME IN SUMMER MONTHS.

"1. During the prescribed period in each year in which this act is in force the local time in Great Britain shall be one hour in advance of Greenwich mean time.

"2. This act shall be in force in the year 1916, and in that year the prescribed period shall be from 2 o'clock in the morning, Greenwich mean time, on Sunday, the 21st day of May, until 2 o'clock in the morning, Greenwich mean time, on Sunday, the 1st day of October, and His Majesty may in any subsequent year, by order in council made during the continuance of the present war, declare this act to be in force during that year, and in such case the prescribed period in that year shall be such period as may be fixed by the order in council.

"3. Wherever any expression of time occurs in any act of Parliament, order in council, order, regulation, rule, or by-law, or in any deed, time-table, notice, advertisement, or other document, the time mentioned or referred to shall be held during the prescribed period to the time as fixed by this act.

"*Provided*, That where in consequence of this act it is expedient that any time fixed by any by-law, regulation, or other instrument should be adjusted and such adjustment can not be effected except after the lapse of a certain interval or in compliance with certain conditions, the appropriate Government department may, on the application of the body or person by whom the by-laws, regulation, or other instrument was made or is administered, make such adjustment in the time so fixed as in the circumstances may seem to the department proper, and if any question arises as to what Government department is the appropriate Government department the question shall be finally determined by the treasury.

"4. This act shall apply to Ireland in like manner as it applies to Great Britain, with the substitution, however, of reference to Dublin mean time for reference to Greenwich mean time.

"5. Nothing in this act shall affect the use of Greenwich mean time for purposes of astronomy or navigation, or affect the construction of and document mentioning or referring to time in connection with such purposes as aforesaid."

I may say that, as you know, England is merely following the example of Germany. In order to take advantage of the industrial situation in England, she wants to get

more daylight during the summer months, and particularly in the mines. She wants to reduce the amount of fuel she has to turn out by her employees so that she can get the additional service of the miners at the front.

Now, Senator, the purpose of the resolution which you introduced is to secure an investigation of the entire time situation, both with reference to standardization of time and with view to taking advantage of the daylight saving plan, as I have suggested.

The CHAIRMAN. What would you think, Mr. O'Laughlin, of adding to this commission as ex officio members two Members of the Senate and two Members of the House, with a view to keeping Congress itself in touch with this investigation, and in that way secure a more expeditious and effective consideration of the subject by Congress.

Mr. O'LAUGHLIN. I think that would be admirable, Mr. Chairman, because it seems to me that with all of these lessons which the war is teaching we should apply them promptly for the benefit of the people of the United States. The commission, as it is proposed to organize it, is for the purpose, of course, first, of having technical advice. The Superintendent of the Naval Observatory, as you know, fixes the time and flashes the time of noon and midnight all over the country, and indeed all over the world. The Chief of the Weather Bureau is interested, because of the relation of time to meteorology, and necessarily there should be on the commission representatives of capital or rather, as it is put there, of the labor industry and transportation industries. By adding two Members of the Senate and the House Congress would be kept in closer touch with the development of the investigation and would be enabled readily to see for itself, from the character of the witnesses who testify and from the testimony itself, the value of the daylight saving plan.

The CHAIRMAN. I was at one time opposed to the selection of Members of Congress on such commissions, but I have found from experience that very valuable work has been done by commissions appointed entirely outside of Congress and very valuable investigations and conclusions are reported, but the report sleeps.

Mr. O'LAUGHLIN. Yes, sir.

The CHAIRMAN. And I now really think it a desirable thing in matters of this kind to have Congress itself represented, because of course Members of the House and Senate feel an interest in the question, and it enables them to be the medium of communication to their associates.

Mr. O'LAUGHLIN. Of course, as you know, I have had a great deal of experience around Congress, and I can testify to the value of that suggestion because it is that personal interest which the hearing of witnesses produces that makes legislation desirable, which I think this is.

It is interesting in connection with this question of standardization of time to know that in Connecticut there is a town where they have refused to change the time in accordance with the eastern time. That town prefers its own time, with the result that necessarily there is a great deal of confusion, and they are very proud of it.

In Savannah, Ga., they have two times; one is the eastern and the other the central time. The railroads run on central time. The natural result is that there are many people who miss trains. In Pittsburgh, I think, they have one time and at Allegheny, across the river, they have another time; and so it goes on in various parts of the country.

I am quite sure—I am indeed certain—that this investigation would develop all the evils which exist at the present time in our inadequate and undesirable time system, and that as a result of a thorough inquiry a system could be developed which would be of the greatest possible value to the railroads, to factories, and every kind of industry and to labor throughout the country.

Of course the Congress of the United States has no power to fix hours of work in the various States, yet by legislating for Washington and for the Territories and by the adjustment of clocks throughout the country the Federal Government could legally and constitutionally control the situation and give the workers throughout the United States a better opportunity to utilize daylight.

The CHAIRMAN. The committee will be glad to receive any suggestions from you that you desire to make as to who should be consulted regarding the carrying out of the purpose of this resolution, and in that event the clerk of the committee will communicate with them and ask their views, which will be published in the hearings.

Mr. O'LAUGHLIN. Mr. Chairman, may I prepare a list and inclose it to you?

The CHAIRMAN. Yes; the committee will be very glad to have that.

Mr. O'LAUGHLIN. I desire to express my very sincere thanks and gratitude to you for your kindness in giving me so much of your time. I know how busy you and every member of the committee is, and I understand perfectly that in giving me this time you have done me a favor which I desire you to know I greatly appreciate.

The CHAIRMAN. The subcommittee will now adjourn.

(The subcommittee thereupon adjourned, subject to the call of the chairman.)

SUMMER TIME COMMITTEE.

REPORT OF THE COMMITTEE APPOINTED BY THE SECRETARY OF STATE FOR THE HOME DEPARTMENT TO INQUIRE INTO THE SOCIAL AND ECONOMIC RESULTS OF THE SUMMER TIME ACT, 1916.

To the Right Hon. Sir GEORGE CAVE, M. P.,
Secretary of State for the Home Department.

SIR: We were appointed by your predecessor on September 29, 1916, as a committee "to inquire into the social and economic results of the summer time act, 1916, and to consider (1) whether it is advisable that summer time should be reintroduced in 1917 and in subsequent years, and if so, (2) whether any modifications in the arrangements are required, and (3) between what dates summer time should be operative."

HISTORICAL ACCOUNT OF THE SCHEME.

1. The originator of the scheme of which the principle was incorporated in the summer time act, 1916, was Mr. William Willett, F. R. A. S., who for many years devoted a great deal of his energies to advocating the adoption in this country of system of daylight saving. His proposal was to advance normal time; i. e., Greenwich mean time, by four steps each of 20 minutes on the first four Sundays in April, which would have extended the day by 80 minutes after the fourth Sunday until September, when by a countermotion of 20 minutes each on four Sundays, clock time would again agree with standard time in Great Britain on the fourth Sunday in that month.

Mr. Willett's proposals were incorporated in a bill which was introduced into the House of Commons by Mr. Robert Pearce on the 4th of February, 1908, and read a second time on the 26th of March, when it was referred to a select committee. This committee agreed on the 30th of June to a special report which found that the object of the scheme, viz, that "of promoting the earlier and more extended use and enjoyment of daylight," during the months from April to September, "is desirable and would benefit the community if it can be generally attained, and that the weight of the evidence submitted to the committee agrees with and supports this view, though there was divergence of opinion as to the best mode of accomplishing it." The committee also found that a single alteration of one hour in April and a similar alteration of one hour in September would be the best mode of attaining the object of the bill, and recommended that "these changes should take place at 2 o'clock in the morning, Greenwich mean time, in the case of Great Britain, and Dublin mean time in the case of Ireland, on the third Sunday in April," and at 2 o'clock in the morning on the third Sunday in September in each year.

The bill was amended accordingly, but no further steps were taken in that session.

2. In 1909 a new bill was presented by Mr. T. W. Dobson, incorporating the amendments made in the bill in the previous year. This bill was read a second time on the 5th of March with a majority of 36, and was again referred to a select committee. This committee reported that "having regard to the great diversity of opinion existing upon the proposals of the bill and to the grave doubts which have been expressed as to whether the objects of the measure can be attained by legislation without giving rise, in cases involving important interests, to serious inconvenience, your committee recommend that the bill be not further proceeded with." They recorded, however, "their appreciation of the efforts of those connected with the movement, and particularly those of Mr. W. Willett, since, owing to these efforts, the hours of beginning and leaving off work have already been advanced in many cases."

3. Daylight saving bills were introduced in the House of Commons in the sessions of 1911, 1912–13, 1913, and 1914, but in no instance were they advanced beyond a first reading.

4. In the spring of 1916 the subject was again revived, and on the 8th of May, 1916, Sir Henry Norman moved in the House of Commons: "That, in view especially of the economy in fuel and its transport that would be effected by shortening the hours of artificial lighting this house would welcome a measure for the advancement of clock time by one hour during the summer months of this year." This motion was carried by 170 votes to 2.

The "Summer Time Bill" was accordingly introduced by the Home Secretary, Mr. Herbert Samuel, on the 9th of May, read a second time on the 10th of May, and became law on the 17th of May. The provisions of the act were put into force on the night of Saturday to Sunday, the 21st of May, and the reversion to normal time took place on the night of Saturday to Sunday, the 30th of September.

5. It was expressly stated by Mr. Herbert Samuel and, we believe, generally understood in the country that the immediate object of the act was to effect an economy in the consumption of coal, oil, and other fuel used in the production of artificial light. Following, however, the instructions in our terms of reference we have not confined our investigations to the question whether this particular purpose was achieved; in fact, the major part of our inquiry has been concerned with the more general question whether one season's experience of the act has in general confirmed the anticipations of its supporters as to its beneficial effects, or the apprehensions of its opponents as to the difficulties and disadvantages likely to arise from its operation.

METHODS OF INQUIRY.

6. We decided at the outset that a much more general reference to the interests affected by this act would be necessary than could be secured merely by hearing oral evidence from witnesses representing such interests. We, therefore, in the first instance addressed, or arranged for the distribution of, a series of questionnaires (of which we print a specimen in Appendix II) to a very large number of authorities, organizations, and individuals, and by this means obtained the general views of every section of the community in regard to the effects of summer time. The following is a brief account of the distribution of these questionnaires.

7. Among the most important and most convenient sources of information as to the effects of the act on the life and habits of the people generally, as well as on particular classes of the community, were the public authorities, i. e., county, borough, urban, and rural district councils, local education authorities, and the police.

The County Councils Association kindly undertook to circulate our questionnaire to all county councils in England and Wales; the Municipal Corporations Association to county boroughs and a selection of smaller boroughs; and the Urban and Rural District Councils Association to a selection of urban and rural district councils, respectively. The Scottish Office and the Irish government arranged for a similar distribution to Scottish and Irish local authorities.

The board of education circularized on our behalf those education authorities in England and Wales who are authorities for both higher and elememtary education, and the Scottish Education Department circularized a selection of education authorities in Scotland. In Ireland the question was referred by the Irish Government to the Office of National Education.

As regard police authorities, the Home Office circularized the chief constables of county boroughs, and of a selection of counties with a large urban population, in England and Wales, while the Scottish Office and the Irish government arranged for the distribution of inquiries to the Scottish and Irish police.

8. In order to ascertain the effect of the act on labor and the life of the working classes we sent out questionnaires to 14 of the principal trade-unions, to the Women's Trade-Union League, the Women's Cooperative Guild and the Mother's Union, and we included a question on the subject in the circulars addressed to commercial, industrial, and agricultural interests (see below). The warden of Toynbee Hall also circularized the heads of a number of representative social settlements on our behalf. The Irish Government circulated inquiries to a number of trade-unions in Ireland.

9. To obtain information as to the effects of the operation of the act on industry and commerce, we sent out questionnaires to 18 representative manufacturers' associations, and (through the home office inspectors of factories) to about 140 individual manufacturing firms; to 10 leading business and commercial associations and to the bankers' clearing house, stock exchange, corn exchange, Lloyds' and the Baltic; to 14 associations of employers in the distributing trades; and to 25 of the largest cooperative societies.

10. We felt that it was an important part of our task to ascertain whether the principal object for which the measure was introduced in the first instance, viz., economy in the consumption of coal and other fuel, had been achieved, and, if so, to ascertain, if possible, the extent of this economy, and also of the saving by the public in their expenditure on artificial light. In our circulars to industrial and commercial associations, individual manufacturers, and cooperative societies, we included a question as to reduction in consumption of artificial light; but it was obvious that, so far as gas and electric lighting were concerned, the only bodies who were likely to be in a position to furnish us with the materials for a general estimate were the gas and electric light undertakings. After consulting the board of trade, we were able to arrange for the distribution of carefully worded inquiries on these points to a considerable number of such undertakings in all parts of the country. The Institution of Gas Engineers was good enough to undertake the distribution to gas undertakings. For the circularization of electric light undertakings we were indebted to Mr. Faraday Proctor and Mr. C. McArthur Butler, of the Incorporated Municipal Electrical Association; Mr. F. E. Gripper, manager of Edmundson's Electricity Corporation (Ltd.); Mr. F. J. Walker, secretary of the St. James and Pall Mall Electric Light Co. (Ltd.); and Mr. A. de Turckheim, secretary of the Incorporated Association of Electric Power Companies.

The secretary of the committee for the regulation of petroleum supplies was good enough to supply us with a statement as to the effect of "summer time" on the consumption of illuminating oils.

11. In view of the fact that, throughout all the discussions on the Daylight-Saving Scheme, considerable apprehension had been expressed as to its probable effects on agriculture, we aimed at obtaining the views of representative farmers and agriculturists from all parts of the country with regard to their experience of the actual results of the act during the first year of its operation. In conference with the board of agriculture, we drafted a suitable questionnaire which was circulated by the board among all the agricultural war committees in England and Wales, with a request that the questions should be submitted in the cases of each committee to five or six representative members, and that a summary of their views should be sent to us. The Scottish office arranged for a similar distribution of questionnaires in Scotland. In Ireland circulars were issued to the County Committees of Agriculture and Technical Instruction.

12. We also addressed special inquiries to certain other organizations and Government departments which apppeared to us to be specially interested, including the Admiralty, Post Office, Astronomer Royal, Meteorological Office, Railway Executive Committee, British College of Physicians and the Royal Geographical Society.

13. As a number of European countries and some of our colonies had last year adopted some form of daylight saving, the Home Office addressed on our behalf a request to the Foreign Office and the Colonial Office that we should be informed of the experience of those countries from which information could be obtained through the usual official channels.

The War Trade Intelligence Department also furnished us with a very considerable quantity of valuable press matter as to the working of daylight-saving schemes on the continent (including Germany and Austria).

14. In addition to the information obtained from the replies to the questionnaires, we invited a number of witnesses representing the most important interests concerned to give oral evidence before the committee, and we held five meetings for this special purpose. At these meetings we received evidence from directors and managers of large individual business concerns, from employers' associations, from the early closing association, from a number of trade-union officials, from the Women's Industrial Council and the Mothers' Union, from representatives of education and of agriculture, of electricity and gas undertakings, of the stock exchange, and from a number of witnesses specially representing Irish interests.

A list of the witnesses appears in Appendix I.

GENERAL SUMMARY OF THE EVIDENCE.

15. We proceed to summarize the main points raised in the very considerable body of evidence furnished to us from England, Wales, and Scotland. (Close on 1,300 replies to the questionnaires were actually received by the committee—over 76 per cent of the number of letters sent out. These figures are, of course, exclusive of a very large number of replies received by various organizations to circulars addressed by them to their members.)

As the evidence from Irish interests is somewhat conflicting and raises, moreover, certain special issues, we have thought it best on our report to deal with the case of Ireland separately (see pars. 90 to 98 below).

PUBLIC HEALTH.

16. As "summer time" was only in operation for a few months and in view of the abnormal conditions prevailing no very definite evidence could be expected as to the effects of the act on the health of the people.

It is, however, almost universally stated that, so far as conditions permitted, the extra hour of daylight was generally used for the purpose of outdoor recreation and pursuits, and in particular for the cultivation of gardens and allotments.

17. It is hardly necessary to attempt to quote in detail all the evidence which we have received on this subject, but the following extracts from a report submitted by Mr. Edward Cadbury from Bournville, though the conditions there can not be regarded as quite representative of industrial districts generally, will serve to illustrate the general tendency.

"The Athletic Club reports that the extra hour of light was a great boon to our members, and cricketers, bowlers, and tennis players took full advantage of it * * *.

"In normal times, when the factory will be working normal hours, the Athletic Club anticipate that the figures will show much greater advantage still being taken of the extra daylight."

"The Open Air Swimming Bath has been made much greater use of than previously in the evening * * *.

"In the gardening classes for boys and girls the extension of daylight was a great advantage and enabled the committee to continue the two-hour meetings of these classes a month longer than in previous years."

18. All our information points in the same direction, and the general medical opinion communicated to us is that the extra hour in the open air must have proved beneficial to the health of those who enjoyed it, although at the moment no particular facts and figures could be adduced in support of the statement. This is the view taken by Dr. Frederick Taylor, president of the Royal College of Physicians, who made inquiries on the subject from a number of the Fellows of the college. Although most of them replied that they had no positive evidence, they nearly all agreed in the impression that the change was beneficial, and Dr. Taylor himself remarks: "The additional hour of sunlight or daylight, in the case of those to whom this is granted by the alteration of the clock time, must tend to improve their health, from the well-known physiological effects of light upon the biological processes in both animals and plants."

19. We have devoted particular attention to the question of the effects of "summer time" on the health of children and we have been glad to find that, in spite of certain statements which had been made to the contrary, the bulk of the evidence (mostly derived from education authorities) favors the conclusion that in the case of children also summer time has proved a success. We deal more fully with the question in paragraphs 32 to 36 below.

PUBLIC MORALS AND ORDER.

20. The police authorities have necessarily been our main sources of information in regard to the effects of the act on public morals and order, and we have found among them a general consensus of opinion that the operation of the act resulted in a definite improvement. During the "summer time" period there were other and perhaps more important forces at work in this respect, but it is generally agreed that the summer-time act did contribute to the improvement which has been observed in public order. Police work is always easier during the hours of daylight than at night, and the closing of the public houses before dark during several weeks materially assisted the greatly reduced police forces in the execution of their duty. The tendency throughout the country to spend the extra hour of daylight in the evenings out of doors is said of itself to have made for an improvement in the general moral tone. In particular, a marked decrease was noticed in some districts in juvenile offenses, which is attributed by the police to the fact that during the summer-time period boys were expected to be home in daylight.

21. In our circular to police authorities we also included an inquiry as to the effects of the act on street accidents. The replies were somewhat conflicting, and a few authorities reported a slight increase in the number of accidents, which, however, it is admitted is probably attributable to other abnormal influences, viz, (1) the increase in the proportion of inexperienced drivers in charge of vehicles, and (2) the fact that more people were out on the streets during the summer evenings in 1916 than in previous years. On the whole, however, the evidence points to a definite, though slight, decrease in most places, which is the more remarkable in view of the abnormal conditions mentioned above.

WORKERS' INTERESTS.

22. Inquiries have been made from a large number of different sources as to the effects of "summer time" on labor and the life of the working classes (see par. 8 above).

So far as the trade unions were concerned, we were not able to obtain quite as much detailed information as we could have wished. However, out of the 14 trade unions to whom we addressed our circular, we had a definite expression of opinion from nine, the general verdict being favorable in each case, though one or two of the secretaries remarked that they had not been able to make detailed or extensive inquiry amongst their members.

Special points were raised by the representatives of the Operative Cotton Weavers' and Shop Assistants' Unions. With these we deal at length in paragraphs 60 to 66 below.

23. The evidence from the associations representing the interests of working women was also favorable. The Women's Cooperative Guild remarked on the tendency on the part of workers and their families to stay up late in the evenings, and on the difficulty experienced by many mothers in getting their children to bed; but they did not consider that this outweighted the advantages derived from the act in other directions.

24. The replies which we received from the wardens of social settlements were all very favorable and seemed to show that "summer time" was widely appreciated by working-class families, though many of the replies recorded the same tendency to stay up late in the evenings which was alluded to by the Women's Cooperative Guild.

An interesting indication of the change in feeling which has taken place amongst those who at first were doubtful about "summer time" is given by the warden of the Robert Browning Settlement at Walworth, who says that their "women's meeting, more than a hundred in number, representing all grades of motherhood in Walworth, who were very dubious at the beginning of the administration of the act, at the close of the season decided with practical unanimity in its favor and in the hope that it would be renewed." The warden adds that "in the height of the summer it was as though a Saturday afternoon holiday had been added to each day."

25. The general view of employers, as expressed in the replies to the questionnaires, was that their employees had taken full advantage of the extra hour's daylight; and while the majority were not in a position, with so short a period for observation, to state positively whether or not an improvement in health had resulted, a number had noticed increased vitality in their workers, and in some cases an improvement in the standard of the work. Only one or two employers recorded the appearance of any ill effects in the shape of tiredness and irregular timekeeping.

We have already cited some interesting statistics supplied to us by Mr. Edward Cadbury; and we may also quote the opinion of Mr. J. E. Hutton, manager of the labor department of Messrs. Vickers (Ltd.), who considered the "summer time" act to be "one of the greatest boons conferred on the industrial classes of the greater towns and cities by recent legislation."

26. We have had evidence from all sources of the value of the extra daylight to the very large number of workers who cultivate gardens and allotments.

27. We have received some letters from individual workers and from persons writing on their behalf, stating that summer time involves hardship on those who have to get up very early in the mornings, not only on account of the difficulty in getting to bed in time (to which we have alluded above), but also on the ground of the alleged reduction in the vitality of the human body in the early morning hours, and the general inconvenience of an extra dark hour at the beginning of the workers' day.

It is to be remarked, however, that we did not receive any complaints on this score from any of the trade-unions who replied to our circulars, or who gave evidence before us; which shows, we think, that no strong feeling on the subject exists among their members. We have heard that the extra darkness in the early morning has been objected to in certain districts by miners, but to what extent we have not been able to ascertain, as the Miners' Federation, who sent out a circular on the subject of summer time to all their branches, informed us that they had not received a sufficient volume of replies to indicate the general feeling of their members.

28. We were not disposed to attach any very great weight to the allegation as to lowness of vitality in the earlier hours, but we felt it would be of value, in view of the very vague ideas on the subject which are current, to obtain a definite pronouncement on the matter from an authoritative source. By a fortunate coincidence the health of munition workers' committee, among the members of which are included certain very eminent medical authorities, have recently been making close researches into the subject in view of its bearing on the question of the efficiency of night work. The committee have been good enough to furnish us with a statement from which we quote the following:

"The results of recent scientific investigation on this question may be shortly summarized as follows:

"The temperature of the human body is not constant, but is known to exhibit a distinct cycle during the 24 hours. A modification in the hours of work and rest leads to a corresponding modification in the hours of highest and lowest temperature. Thus a party of Arctic explorers found that a complete reversal of their hours was followed within a few days by a similar reversal of their temperature curves.

"It follows that the establishment of 'summer time' should not increase the difficulties experienced by abnormally early risers except in so far as their friends and neighbors may tend to postpone their hour of going to bed and to curtail their rest

period. The committee has no reason to suppose that the large number of men and women workers who frequently rise before 5 a. m. in order to commence work at 6 a. m. were adversely affected last summer."

29. The above opinion seems to confirm what had been our own strong impression, viz., that nearly the whole trouble of those who found it irksome to get up in the early mornings during any part of the summer-time period, or who complained of feeling tired during the day, was their failure (and the failure of their neighbors) to retire to bed at the same hour by the clock as at other times of the year. This is, we feel confident, a circumstance we do not believe that, in a reasonably limited summer-time period, the inconvenience of extra darkness in the mornings will weigh very heavily, particularly in view of the advantage gained at the other end of the day.

30. We fully recognize, however, that the very early risers would have reason to complain if summer time were made to begin as early or end as late as some would wish to have it, and in deciding upon our recommendations we have borne their interests carefully in mind.

31. Taking the whole of our evidence, we are satisfied that the great bulk of the working classes are favorable to summer time, and we are convinced that they stand to profit by it as much as, and in many cases more than, any other section of the community. Such real inconveniences as have been experienced will, we believe, be remedied with a little more experience of summer-time conditions.

It has, moreover, been frequently pointed out to us that the great pressure of work under war conditions has prevented many workers from taking much advantage of the extra daylight, which they will be able to enjoy more fully when normal times return.

CHILDREN'S SLEEP.

32. A serious allegation made against the summer-time act was that it had led to a curtailment of the sleeping hours of children, who are allowed by their parents to stay out of doors in the evenings beyond their proper bedtime.

We recognize that this point was one which demanded particularly close inquiry, and we have carefully examined the replies to the question on the subject which was asked in the circular sent out to education authorities. In addition, we discussed the matter personally with some representative school-teachers and medical officers.

33. We are glad to be able to report, as a result of all the evidence which we have received, that while in a certain number of districts a tendency to shortened sleeping hours has been noticed, the fears which were entertained in the matter have not in the main been justified.

Of the English and Welsh education authorities who replied to the circulars, about 46 per cent, and of the Scottish school boards about 80 per cent, appear to have had no evidence of curtailment of sleep. Of the rest, who report a tendency to curtailment, the majority state that only a limited number of children were affected, or that the tendency was confined to the first few weeks of summer time, before people were fully accustomed to the change.

34. The tendency, where it was noticed, manifested itself, as a rule, by tiredness and lassitude or by restlessness in the morning hours and seems to have been most apparent, as was to be expected, in the case of small children from the poorer districts, where home conditions are lax.

Only a few authorities appear to consider that the disadvantage so pronounced as to outweigh the other advantages which children derived from the act. The opinion of the very large majority, and the enthusiastic opinion of a great number, is that the children benefited by the operation of summer time, both by reason of the extra time which they were able to spend in the open air and also because of the cool hour gained in the morning in the place of a trying hour in school in the heat of the afternoon. Many authorities reported that children had been brighter and fresher in the mornings in consequence.

This view was confirmed by the medical opinion which we received, and it was unanimously supported by the witnesses who gave evidence before us.

35. Our attention has, moreover, been drawn to the fact that even in normal times there is a tendency amongst children of the poorer classes to lose sleep at the height of summer by staying out too late, and we were informed by Dr. C. J. Thomas, principal assistant medical officer of the London County Council, that reports concerning fatigue and sleepiness of infants in school had been more numerous in some previous years than in 1916. Dr. Thomas also pointed out that the advent of "summer time" was accompanied by warnings in this connection, and that closer attention had perhaps been paid to the matter than was usual.

36. While, however, we are glad to be able to report thus favorably on the whole in regard to this very important aspect of our inquiry, the fact remains that in certain districts children did lose sleep, and we are strongly of opinion that all possible steps should be taken by education authorities through the school medical services and the care committees to insure that the tendency shall be kept within the narrowest possible limits in the future, if summer time is renewed. It is no doubt a difficult matter in many cases to persuade children to go to bed during daylight (though this is a not problem peculiar to "summer time"); nevertheless, many of the authorities comment severely in their replies on the carelessness shown by parents in regard to their children's sleeping hours.

Accordingly, we recommend that the attention of parents should be drawn by every education authority to the danger, and that it should be a standing instruction teachers to report all cases showing symptoms of loss of sleep to the care committees, who can then take the matter up with the parents either by visit or letter. Effective action of this kind was taken by certain authorities in 1916, and others announced their intention of taking such steps in the future. We commend the matter to the careful consideration of the departments concerned.

TRADE, INDUSTRY (OTHER THAN AGRICULTURE) AND COMMERCE.

37. The replies received to the very comprehensive inquiries which we have described in paragraph 9 above, show beyond all question that the opinion of employers in every trade, industry, and business throughout the country, is overwhelmingly in favor of summer time. We summarize the evidence on points of detail, such as the effects on the health of workers, saving in artificial light, etc., under the appropriate headings elsewhere in our report.

The only industry which had any complaint to put before us was the cotton trade, in which some inconvenience arose out of the necessity for lighting up the factories in the early mornings in the second half of September. We discuss this question in paragraphs 65 and 66 below.

ECONOMIES IN ARTIFICIAL LIGHT AND FUEL.

38. As mentioned in paragraph 9, above, we made extensive inquiries among gas and electric light undertakings as to the economies effected during the summer time period in artificial light and fuel; and we also included a question on the subject in our circulars to industrial and commercial associations, individual employers, and cooperative societies.

39. In our questions to gas and electric light concerns, we asked for estimates (*a*) of the percentage of reduction in the consumption of light during the summer time period, (*b*) of the consequent saving in the consumption of coal or other fuel, and (*c*) of the actual saving in expenditure by consumers on artificial light, due in each case to the operation of the summer time act alone, allowance being made so far as possible for other influences.

40. We realized from the beginning that the very exceptional conditions prevailing during the "summer time" period last year would in all probability make it difficult to arrive at any very definite estimate on these points. Unfortunately, our apprehensions in this respect have been confirmed, and although we have been furnished with a large mass of information, we feel that for the purpose of arriving at any definite figures for the country as a whole it is somewhat unsatisfactory.

There were during the period so many other forces at work, often of a very conflicting nature, influencing the consumption of light and fuel, that the figures supplied to us were, for the most part, and could only be, rough estimates. The lighting restrictions, the earlier closing of public houses and (in many districts) of shops, the increase in the charges for electricity (made in many cases before "summer time" came into operation) all tended to reduce consumption during the period. On the other hand, the great increase in overtime and night work in many industrial districts, and the multiplication of factories and offices, tended to increase the consumption of light. In the case of the gas undertakings there were further complications, to which we allude later. It was, therefore, almost impossible to arrive at the results of one factor only out of so many, and, owing to the lack of uniformity in the methods of allowing for the other operating influences, any general estimate based on the figures furnished to us can at the best be only conjectural.

41. As an illustration of the complexity of the problem, we may cite some interesting figures supplied to us by the Chief Engineer of the Manchester Corporation Electricity Works. For the three months ending September 30, 1916 (during which "summer time was in operation), the lighting units sold by the works showed an increase of 7 per cent, but a more detailed analysis of the figures for certain typical areas showed the following results:

In four residential districts, there had been a marked decrease (about 15 per cent) as compared with the corresponding period in 1915:

	1915, units.	1916, units.
No. 1	5,186	3,931
No. 2	28,524	26,080
No. 3	36,080	32,059
No. 4	25,973	18,821

Three industrial and shopping districts showed, on the other hand, a marked increase (about 8 per cent), which the chief engineer attributed to war work and the revival of retail trading:

	1915 units.	1916 units.
No. 1	70,694	74,769
No. 2	61,252	63,009
No. 3	180,180	199,021

This case is by no means exceptional, either among electricity or gas concerns.

42. Nevertheless, though it has proved so difficult to arrive at any accurate estimate of the economies effected in light and fuel, it is perfectly clear that the substitution of an hour's daylight in the evening during many weeks of the year for an hour's artificial light must have resulted in a considerable net saving; and this is certainly borne out by the information furnished to us.

43. *Electric lighting.*—Replies were received from over 80 municipal electric light undertakings, from between 50 and 60 private companies, and from 11 electric power companies. The estimates of the reduction in the consumption of electric light vary very widely, from 125 per cent in one case to 55 per cent in another.

The returns from the power companies give a mean reduction of 20 per cent for lighting purposes; 38 private companies furnished figures which give an estimate of reduction varying from 10 to 41 per cent, the mean for the 38 being 23 per cent, and 64 municipal undertakings give a mean reduction of 18.3 per cent in units used for lighting.

44. It would appear from the returns to our questionaires that the estimates of the saving in coal and the reduction in expenditure on artificial light are largely calculated on the basis of the estimate of the reduction in the consumption of units, and are therefore subject to exactly the same criticism as that figure. Further, so far as the saving in coal is concerned, it is pointed out in many cases that the falling off in the quality of coal supplied last year as compared with previous years increased the difficulty of arriving at an accurate figure. Our returns, however, show clearly that the saving in coal throughout the country must have been considerable. One point should be made clear in this connection, viz, that although in some few cases there may be a reduction in the consumption of artificial light, in other cases—e. g., in the case of companies which supply a considerable amount of electricity for power purposes—the saving in coal may be trifling, as the plant has to be kept in readiness to supply the maximum demand, and the consumption of coal for "standby" is an important factor in the total consumption, particularly in summer time, when, although boiler and electric pressure have to be maintained throughout the 24 hours, the actual lighting hours are very few.

45. The following interesting calculation as to the three main sections of our inquiries was placed before us by Mr. Faraday Proctor, the honorable secretary of the Incorporated Municpal Electrical Association. In his calculation Mr. Proctor assumed as his basis that the summer time period would extend from the beginning of April to the end of September. The following are his words:

"The lighting consumption in the six winter months may be taken on the average as being twice that of the six summer months. If, therefore, the diminution in consumption is taken at from 5 per cent to 25 per cent for the summer months, this corresponds to a diminution of from 1.7 to 8.3 per cent of the lighting consumption for the whole year.

"I have extracted data from the copies of the annual accounts of all those municipalities who show the output for power and other purposes, and the same indicates that the total number of units sold is 4.37 times the number sold for lighting only; that is to say, the lighting units are 22.883 per cent of the total units output.

"The figures I have extracted relate to undertakings representing about 25 per cent of the total output by municipalities or about 17½ per cent of the total output by municipalities plus companies as returned in Garcke's Manual, and may, I think, therefore be taken as representing a reasonable average, and if these figures are accepted then the diminution in the consumption due to the summer time act would represent from 0.39 per cent to 1.9 per cent of the total units sold per annum for all purposes throughout the Kingdom.

"The total units sold for all purposes by municipalities and companies is about 2,000 millions per annum.

"At 3½ pounds of coal per unit sold this would represent a consumption of 3,125,000 tons of coal per annum.

"At 4½ pounds[1] of coal per unit sold this would represent a consumption of 4,017,000 tons of coal per annum.

"At 5½ pounds of coal per unit sold this would represent a consumption of 4,910,000 tons of coal per annum.

"Owing to the standing charges, a diminution of the units sold does not result in a corresponding diminution in the coal bill. I estimate in my own undertaking, which may perhaps be taken as an average, that the diminution in the putput would result in a saving of only 66 per cent of a corresponding diminution in the coal bill. Therefore if the total units sold are reduced by from 39 per cent to 1.9 per cent the coal bill would be reduced by, say, 66 per cent of this, viz, by from 0.2574 per cent to 1.254 per cent, and on the table of coal consumptions above given, the resultant saving in coal throughout the Kingdom in respect of the supplies afforded by municipalities and companies would be as shown in the following table:

Total annual coal consumption and saving in same due to summer time act on low, mean, and high estimates.

	Reduction in lighting units.	5 per cent.[1]	25 per cent (summer period only).[2]
Total coal for light and power:	*Tons.*	*Tons.*	*Tons.*
Low	3,125,000	8,043	39,187
Mean	4,017,000	10,340	50,370
High	4,910,000	12,640	61,570

[1] Saving, 0.2574 per cent. [2] Saving, 1.254 per cent.

"With such widely divergent views as to the percentage reduction in the consumption of electricity for lighting, it is difficult and perhaps presumptuous, for me to suggest what percentage figure should be accepted, but I should say that one should not look to the saving in coal exceeding from 10,000 to 20,000 tons per annum as directly attributable to the variation of one hour per day summer time for a period of six summer months.

"If the lighting units are as mentioned above, 22.883 per cent of the total units, the total lighting units per annum would approximate 457,660,000.

"A reduction of 1.7 per cent in the lighting units will amount to 7,780,000 units per annum.

"A reduction of 8.3 per cent in the lighting units will amount to 37,980,000 units per annum.

"The average revenue from lighting is about 2.7 pence per unit, and therefore the loss in gross revenue to electrical undertakers and the saving in expenditure by consumers would approximate in the case of the lower estimate to 87,520 pounds, and in the case of the higher estimate to 427,290 pounds."

46. We also addressed a question to electric light concerns as to whether the charge for light had been increased during the summer time period, and we found that such had been the case with a very considerable proportion of the undertakings. This was so with about 30 per cent of the municipalities, and nearly 50 per cent of the private companies, who replied to the circulars. In many cases, however, it was pointed out that the increase had been decided upon before the summer time act came into operation and was due to other causes, such as the increase in the price of coal and the cost of labor and stores; while in the other cases almost without exception it is stated that the increase last year was only partly due to the act. It is frequently

[1] Mr. Proctor considered this to be the most reasonable figure to take as an average. The figure varied; in Bristol it was 4½ pounds; in Manchester, 3½ pounds; but in other places it would be considerably higher.

pointed out that an increase in charges will probably be necessary in future years if summer time is renewed, more particularly in the case of the smaller concerns where lighting forms the most important part of the business.

47. *Gas.*—Replies were received from 85 gas undertakings, the majority of whom gave figures, though many emphasized the difficulty of arriving at even approximate estimates of the kind required. In addition to the influence of the lighting restrictions and of the other factors which we have mentioned in paragraph 40 above, there was, in the case of the gas undertakings, the further complication of a very large increase since the summer of 1915 in the quantity of gas supplied (*a*) to private houses, for heating and cooking purposes in the place of coal, and (*b*) in industrial districts, to munition and other factories for power; resulting, in the case of a considerable number of undertakings, in a substantial increase in the total output of gas over the summer time period as compared with 1915. It appears that the nature of the records kept by the majority of the undertakings did not permit of their being readily sifted for the purpose of arriving at the estimate we asked for, particularly with the limited time and staff at the disposal of the management.

48. Accordingly, as in the case of the estimates from the electricity concerns, there was a considerable diversity in the methods of calculation employed. In many instances it was not indicated what had been the basis of reckoning.

The estimates of the percentage of reduction in consumption of gas for lighting purposes varied from 2 per cent to 2.6 per cent. The mean—not a very valuable figure in the circumstances—works out at about 9 per cent.

49. Mr. Hanbury Thomas, of the Sheffield United Gas Co., has suggested that a general estimate for the whole country can be arrived at from the figures of actual saving in coal given in the replies from those undertakings who use coal and no other fuel, on the following plan: The amount of coal stated by such undertakings (28 in number) to have been saved as a direct result of summer-time works out in the aggregate at 1.449 per cent of the total quantity carbonized by them. The total quantity of coal used by all gas undertakings in the United Kingdom in 1915 was, in round figures, 18,000,000 tons. Reckoning 1.449 per cent of these figures, therefore, the saving in coal effected by gas undertakings in the United Kingdom as a result of the four and one-half months of summer time may be put at about 260,000 tons.

Further, applying the same percentage to the total annual sum spent by consumers on gas (reckoned on the total annual sales of gas undertakings,[1] at 3 shillings per 1,000 cubic feet) the saving in expenditure to consumers works out at about 475,000 pounds.

These estimates can not, of course, be regarded as anything but conjectural; but they represent the best that can be done with the figures, and are not perhaps very far wide of the mark.

50. It is obvious that these must also have been a very considerable saving in the quantity of oil used by those gas undertakings which manufacture water gas, but unfortunately we have not sufficient data to make it possible to form an estimate.

51. *Evidence of employers.*—The great majority of the replies which we have received from individual employers, from business and commercial associations, and from cooperative societies, agree in the view that, except in the case of factories which were running continuously day and night, there had been a substantial saving in the consumption of artificial light.

The secretary of the Drapers' Chamber of Trade sent out a special letter on the subject to some 200 members of the chamber in London and in the Provinces, and 50 per cent of the replies furnished figures giving an average estimated saving of 22 per cent. Similar estimates furnished to the National Chamber of Trade, in reply to a circular sent out by them to their affiliated associations and individual employers in the distributing trades, gave an average of well over 30 per cent. Estimates received from 13 chambers of commerce, however, averaged under 16 per cent.

52. *Illuminating oils.*—As we have already mentioned, Mr. E. Houghton Fry, the secretary of the committee for the regulation of petroleum supplies, was good enough to supply us with a report as to the effects of summer time on the consumption of illuminating oils in this country. Mr. Fry estimates that the economy effected by the summer-time act in the consumption of these oils amounts to about 2½ per cent of the consumption for the year, i. e., approximately 11,500 tons. Mr. Fry adds: "This seems a very modest proportion, but it should be remembered that 11,000 tons represents two journeys by an oil tanker, which would occupy approximately four months, and this saving, therefore, can by no means be regarded as negligible. In fact, owing to the shortage that is at present being experienced in these vessels, the result is a very welcome one."

[1] According to the board of trade returns for 1913, plus 6 per cent, which Mr. Hanbury Thomas thinks might be added to represent the increased consumption since that year.

AGRICULTURE.

53. As might have been expected, the opinions of farmers and those interested in agriculture have been more conflicting than those of any other interest, in many cases totally diverse opinions as to the effects of summer time having come from the same district.

54. The difficulty most widely recorded occurred in connection with harvest operations, owing to the fact that ordinary harvest work could not be done until the heavy morning dews had lifted. This difficulty was naturally accentuated in the North, where harvests are later, and was more marked in the corn than in the hay harvest. In the majority of cases in which the difficulty was experienced it is admitted that it was satisfactorily met by making arrangements with the farm workers to adhere to sun time at least during harvest. The inconvenience seems to have been greater on farms which combined dairying with corn growing, etc., as workers had in those cases to come according to summer time in order to get the milking done for the delivery trains, and then had an interval before harvesting could be commenced. Many farmers report that under these circumstances they had to pay overtime for the extra hour in the evening. Others point out, however, that advantage had been taken of this intermediate period between milking and harvesting to do other work which often has to be neglected during harvest.

We find that the general opinion is that difficulties were easily overcome by organization, and that the very definite advantage of having an extra evening hour for carrying crops outweighed any inconvenience. Many reports also mentioned the advantage at harvest time of the help of workers employed in other occupations whose longer evenings made it possible for them to give assistance on the farms. This, of course, occurred chiefly in districts near villages or towns.

55. In some cases trouble was experienced with milkers who were, it is said, unwilling to commence work in the very early mornings, and it is also stated in a few instances that at the outset the quality and quantity of the milk was affected by the earlier milking. These difficulties are only mentioned in a few of the replies and the majority even of these few add that they were only temporary.

56. In the gathering and transit of fruit and vegetables, the operation of the act is generally reported to have been very beneficial, as in almost all cases these are better gathered with the dew on and transported during the cool of the day.

57. In the opinion of the large majority of employers the act has been a genuine advantage to the agricultural laborer, in that he has had an extra evening hour to work in his own garden, or, in other cases, has frequently earned overtime wages for evening work which, at a time when labor was scarce, was of very special value on farms. Some reports hold that the act made the laborers' day in effect an hour longer, particularly during the longest days, and that he was overtired and consequently of less value to his employer; but the general mass of evidence received by us seems to controvert this view. Some difficulty was experienced at first in regard to carters, who have to get up in the morning considerably earlier than other workers, but in most cases this soon disappeared.

58. It seems clear that on many farms and in some entire districts (so far as the agricultural community was concerned) the act was not observed at all, the farmers and others refusing to alter their clocks. The complete ignoring of the provisions of the act by one section of the population resulted in two different times being kept in the same neighborhood—old time on farms and summer time in schools, post offices, railway stations, and similar places. This naturally caused confusion and friction, particularly in the home of the agricultural laborer who had to work according to old time, while his children went to school by summer time, with the result that the meal hours of different members of the family did not coincide.

It may be that during certain periods of summer time, particularly during the harvest, some readjustment of the hours of work on farms will prove desirable, but if this only amounts to altering the working hours—i. e., changing the hour of commencing work from, say, 6 a. m. to 7 a. m.—it need not involve any serious interference with domestic and other arrangements. Our evidence goes to show that no confusion need arise, except where the clocks are left unaltered and where a general policy of nonobservance of the act is adopted by a particular class or section of the people.

59. In spite of such difficulties as have been recorded, a very large majority of farmers and war agricultural committees are in favor of the renewal of the act, and the majority even of those who are of opinion that it was not advantageous to agriculture consider that it should be renewed, as they recognize its great benefits to the community at large.

The opinions of farmers and agriculturists vary widely as to the dates for the beginning and the end of summer time, but the period most generally favored by the agricultural community for the application of the scheme would seem to be from the middle of April to the middle of September.

LATER CLOSING OF SHOPS.

60. Suggestions were made during the summer-time period that advantage was being taken of the extra hour's daylight by shopkeepers to keep their shops open an hour longer, and the matter was raised in the House of Commons and to some extent discussed in the press. The allegation was a serious one, particularly in view of the fact that shop assistants are clearly among those who stand to gain most by summer time; and we accordingly included inquiries on the subject in the questionnaires addressed to local authorities and to association connected with the distributing trades. A number of the latter made exhaustive inquiries on the subject amongst their members; in particular the National Chamber of Trade obtained the opinions of their affiliated organizations in all parts of the country. We also discussed the matter personally with the secretaries of the Shop Assistants' Union, the Early Closing Association, and the president and secretary of the Drapers' Chamber of Trade.

61. The secretary of the Shop Assistants' Union (Mr. John Turner) informed us that, while the summer-time act was in general regarded with satisfaction by his union, there had been cases in which it had led to extension of hours of work amongst shop assistants, causing serious discontent and irritation. It was true that the tendency was most marked among the small retail shops, but it was just in this class of establishment that the most serious cases of overwork and long hours were found. Mr. Turner was of opinion that there had been an extension of hours in more than 5 per cent of the shops in the United Kingdom. His union felt that the evil was one which would tend to grow and they pressed strongly that there should be some statutory provision to meet the point.

62. Mr. Turner's statements were not, however, supported by the evidence which we received from the other sources. Out of 186 local authorities who replied to our questions, only 11 had notices any tendency toward later closing. The associations of employers in the distributing trades were also almost unanimously of the opinion that there had been no extension of hours. The secretary of the Early Closing Association (Mr. Albert Larking), who warmly supported the summer-time act, informed us that he had received no complaints of later closing; had it been adopted to any extent in the distributing trades, the fact would certainly have been brought to his notice.

63. The evidence from Ireland was very similar. The Drapers' Assistants' Benefit and Protective Association stated that shops had been closed later in certain districts, but the Grocers' Assistants' Association and the great mass of the local authorities had not had any evidence of it.

64. Taking the evidence as a whole, therefore, while undoubtedly there have been cases of later closing during the summer time period in a certain number of districts, chiefly among shops of the smallest class (and therefore not always involving the hours of an assistant), it is clear that the tendency has not been a marked one. There is no doubt that the great mass of opinion in the distributing trades and public opinion generally is against the practice, and, so far as concerns establishments which employ assistants, we can not think that it is ever likely to spread beyond a very small and not over-reputable minority of shopkeepers. It may also be remarked that it is only possible in those districts or in the case of those classes of shops which are not covered by closing orders under the shops act.

We think, however, that a watch should be kept on the matter by the home office and the local authorities.

EARLY MORNING LIGHTING IN THE COTTON TRADE.

65. We have already mentioned that it was found generally necessary in the cotton trade to use artificial light in the early mornings during the second half of September. In the case of weaving sheds in Lancashire this has given rise to a peculiar difficulty. It was represented to us that in a warm September the use of artificial light in the sheds would raise the temperature to such a degree that the operatives would refuse to work in them. In 1916 September happened to be a cool month, but even then, it was stated, the difficulty had been experienced.

These points were put to us by the Cotton Spinners' and Manufacturers' Association, and confirmed by the Amalgamated Weavers' (Operatives) Association, both of whom gave evidence before us.

66. One obvious remedy was, of course, to start and finish work somewhat later during the fortnight or so in September when otherwise it would be necessary to use artificial light in the mornings. This expedient was tried in a number of cases, but was objected to by the operatives on account of the disorganization which the altered mealtimes produced in their domestic and traveling arrangements. This does not appear to us to be an insuperable difficulty, and we should certainly not be justified in suggesting that a purely local inconvenience of this character should be met at the expense of the general interests and wishes of the community as a whole. However, in point of fact, it will be seen that we have recommended below, mainly on other grounds, an earlier date for reversion to normal time, than was dopted last year. This should, we think, go a long way toward meeting the difficulty of the Lancashire weaving sheds.

STOCK EXCHANGE.

67. In reply to an inquiry which we addressed to them, the stock exchange committee brought to our notice a difficulty arising out of the operation of the summer time act which they feared might in normal times cause them considerable inconvenience.

It is important that some portion of the business hours of the London Exchange should coincide with a portion of the New York Exchange session. Before the war, the last hour during which the London Exchange was open (3 to 4 p. m.) overlapped the first hour (10 to 11 a. m.) of the New York session, and during this hour in normal times a vast amount of business was done, and was often continued in the street after the London Exchange had closed. At the present time, however (for reasons connected with the war), the London Exchange closes at 3 p. m., but after the war, when normal conditions are restored, the importance of coincident periods in the two sessions may possibly be still greater than in former times.

68. It is clear that the difficulty might be overcome by keeping the stock exchange open later during the summer time period, but it was pointed out to us that this course is open to objection, as it would practically compel the markets in other securities to remain open, and would not allow time for members to attend to their correspondence and prepare their contract notes before the departure of the mails. The proposal would therefore result in longer hours for a section of the stock-exchange population.

69. We recognize the importance to the two exchanges of a coincident period in their sessions, but we believe that the difficulty in securing it during the summer time period is capable of adjustment between the London and New York Exchanges without serious inconvenience to their members and their clerks.

METEOROLOGICAL WORK.

70. The operation of summer time last year appears to have introduced some elements of uncertainty and difficulty into the work of the meteorological office. Sir Napier Shaw, the director of the office, supplied us with an interesting statement on the subject, the most important features of which we give below.

71. The work of the meteorological office, we were informed, has to be regarded from two points of view, viz:

(1) The current daily work of collecting information by telegraph from about 100 observatories and stations in the United Kingdom, on the Continent, and the Atlantic islands, and distributing reports, storm warnings, etc., based on this information, to various quarters.

(2) The public record, which involves collection by the week or the month of (mostly voluntary) observations from 500 stations, in addition to the 100 official stations above mentioned.

72. The current daily work was continued at the same hours as previously, by Greenwich time, in accordance with the proviso in section I (5) of the summer time act. Consequently, as the messages from the stations are always telegraphed at the last possible moment before the closing of the post offices, the hour for sending them had to be changed, thus spoiling the continuity of the records.

Moreover, the whole daily output of the office's reports, forecasts, and storm warnings was nominally an hour late. So far as storm warnings are concerned the delay of an hour would have been fatal, since the country post offices were closed before the reports could be prepared and the hoisting stations could not therefore have been reached by telegraph.

No inconvenience, however, actually resulted in this respect in 1916, because, by request of the Admiralty, the general issue of warnings to coast stations had already been suspended on other grounds.

The distribution of the daily weather reports by early post (1.30 p. m. at the G. P. O.) had to be abandoned.

The opinion of the French service was taken as to the possibility of accelerating the whole service permanently by an hour, but the proposal was not favorably received.

However, summing up the general effect of summer time on the current daily work, Sir Napier Shaw observes that "the inconveniences were as far as possible overcome without serious complaint from the services or the various naval and military establishments for which the information was collected."

73. As regards the public record, Sir Napier Shaw remarks that it is too soon to form an official opinion. In spite of very careful instructions, a great deal of confusion arose with the observers as regards the hours at which the observations were made, and the continuity of many series of observations has been interrupted. "My impression is," he says, "that there is now no possibility of placing beyond dispute the exact time of any event, except those dealt with by telegraph, which occurred between May 21 and September 30. A feature historian may find it impossible to fix the exact hour of the battle of Jutland. How many discontinuities, intentional or unintentional, there are in the records, will only be known when we summarize the results for the year, and how far they will affect the value of the results to be obtained from the observations will not be disclosed until we know what questions the services want us to answer. From the scientific point of view the discontinuity of hour introduces a defect which is fatal and for which there is no remedy."

74. Sir Napier Shaw concludes: "We have got through the immediate difficulties of summer time by making special provision of one sort or other to meet complaints addressed to us. For the future, if the experiment of 1916 is repeated, the proper course will be again for us to keep continuity as far as possible and make good the requirements of the service by whatever special provision we can devise and carry out."

75. We do not feel that we can add anything to Sir Napier Shaw's statement; but we may perhaps express the hope that the proposal for a permanent acceleration by one hour of the international service of weather reports (which we are told is not impossible to carry out, although it involves certain difficulties) will receive further consideration.

THE ALTERATION OF THE CLOCKS.

76. Considerable apprehension had been expressed as to the confusion that would be likely to arise when the actual changes in time were made. As a matter of fact, the transitions from normal to summer time and vice versa seem to have been accomplished without any public inconvenience of any kind, though we believe that summary methods of putting back the time on the September 30 (in spite of the official warning on the subject) led to a number of casualties among striking clocks.

FOREIGN COUNTRIES.

77. We have described in paragraph 13 above the steps taken to obtain information as to daylight-saving schemes in foreign countries. In accordance with the request of the home office the foreign office was good enough to circularize H. M. representatives in the allied and neutral European countries concerned, asking for information as to the general effects of summer time in each, and as to the intentions of the Government with respect to 1917 and future years. Up to the present moment, however, only a few replies have been received; and thus, though valuable matter from foreign press had been supplied to us by the editors of the daily notes of the war-trade intelligence department, our information on the subject is very far from complete. The following, however, is a summary of the information which we have gleaned:

78. Daylight saving schemes were adopted last year in France, Holland, Denmark, Norway, Sweden, Italy, Portugal, and in Germany and Austria. The schemes were started on various dates from May 1 onward, and terminated for the most part at the end of September, the only exception apparently being in Portugal, where summer time was continued until October 31. The variation from normal time seems to have been one hour in every case.

79. *France.*—Judging from press reports summer time appears to have been a great success in France, and there were advocates for a starting date as early as February 15 this year. The matter does not seem to have been finally settled by the Government. We understand that the Chamber of Deputies has voted in favor of starting summer time on April 1, and continuing it till September 30, with a variation of one hour over the whole period. The question, however, has still to be considered by the Senate, and there seems to be a possibility that the starting date may be put back into March.

Holland.—According to accounts in the Dutch press, the official attitude toward summer time is favorable. An extensive investigation has been made, and an early decision in the matter is expected (January 26).

Denmark.—According to Danish newspapers, no inquiry on the subject of summer time has been made by the Government and it is probable that they will be guided by what Sweden and Germany decide to do. Opposition is reported from country districts.

Norway.—In an official commentary from the Norwegian Government it is remarked that the effects of summer time are not considered to be of any importance on account of the light summer evenings prevalent in the northern latitudes. Factory workers are stated to have been dissatisfied on the ground that "work began one hour earlier, while the hour of going to bed was just as late." The opinion of employers is said to be divided. On the other hand, commercial workers, particularly those in subordinate positions, seemed generally to have appreciated the extra daylight. Agricultural opinion was generally unfavorable. The reduction in consumption of artificial light, and consequent saving in coal and other fuel is considered to have been small.

No decision as to 1917 had been reached by the Government at the end of January.

Sweden.—The evidence from Sweden appears to be rather more favorable, so far as town life is concerned. While the saving in light and fuel does not appear from the press accounts to have been great, one newspaper reports an estimated saving of 50,000 kroner (about £2,800) to the inhabitants of Gothenburg on electric current and of 2,500 kroner (about £140) on coal used in the production of gas. The Government is stated to have called for reports from all the districts as to the working of the scheme in 1916.

Italy.—We have had no information as to the working of the scheme in Italy in 1916 or as to the prospects of its reintroduction.

Spain.—Daylight saving was not adopted in Spain last year, and the intentions of the Government as to the future have not yet transpired.

Portugal has decided to begin daylight saving this year on March 1, and to continue it (as last year) up to the end of October.

80. *Germany and Austria.*—The Prussian Government have made elaborate inquiries amongst all the interests concerned, and a number of German and Austrian newspapers have also been conducting researches on their own account.

The evidence from trade, commercial, and industrial sources, and from town interests generally, seems to have been distinctly favorable. Striking instances are given of saving in artificial light and fuel in various large cities; e. g., at Berlin the municipal gas works were able to report a decrease during May and June of 508,500 cubic meters, notwithstanding the fact that 18,000 new gas meters were put up during the first six months of 1916, and the records from January to April showed an increase of 24,000,000 cubic meters output of gas as compared with 1915.

In the country districts of Germany the agricultural opposition appears to be strong (hence, it is stated, the reason why the Prussian Diet, which is predominantly agrarian in character, recently reported unfavorably on the summer time). School children are said to have suffered from loss of sleep in many country districts, chiefly, it appears, owing to the late hours which the parents were obliged to work in the fields; and the hope is expressed that all schools may be permitted to start at 8 a. m. instead of 7 a. m. in future summers.

It appears to have been the intention of the German and Austrian Governments all along to retain summer time for the period of the war. According to the most recent statements the 15th of April has been decided upon as the starting date for this year.

81. *America.*—We understand that there is a movement in America toward the adoption of daylight saving, and that the Government has instructed their representatives in various European countries to inquire into the working of the schemes in 1916.

82. It is hardly necessary for us to point out the value of close international cooperation in the matter of summer time between the United Kingdom and the other European countries who observe the Greenwich meridian; in particular, it would clearly have been a great advantage to have had a common arrangement with France. We have given in paragraph 79 above such information as has been supplied to us through the foreign office as regards the present position in France; but at the time of presenting our report a final decision has not yet been reached by the French Government, and we are not therefore in a position to discuss the matter in detail.

THE COLONIES.

83. According to information which has been supplied to us by the colonial office, daylight saving schemes have been adopted in Australia and, to a certain extent, in Canada; but not in New Zealand (where a summer time bill was defeated) or in the Union of South Africa.

In Australia, daylight saving was adopted by the Tasmanian Government on the first Sunday in October last, and is apparently to continue until the last Sunday in March. After a period of negotiation between the other States, daylight saving was eventually put into force by the Commonwealth Government for the whole of Australia on January 1.

In Canada daylight-saving schemes have been tried by numerous communities with varying success during the past few years. Last year the Legislature of New Brunswick passed an act providing for daylight saving from the 30th of April to the 30th of September, but the act was not "proclaimed," and was only carried into effect by the city of St. John, where it was quite successful. The act will probably be "proclaimed" this year.

It has not yet been decided whether any action is to be taken this year for the Dominion as a whole.

CONCLUSIONS.

84. Taking the evidence we have received as a whole, we can unhesitatingly say that the vast preponderance of opinion throughout Great Britain is enthusiastically in favor of summer time and of its renewal, not only as a war measure, but as a permanent institution.

As we have already pointed out, some difficulties have undoubtedly been experienced, but not to anything like the extent predicted by the critics of the scheme, and we have not heard of any that could not be overcome with good will and organization. Indeed, the experience of summer time in 1916 has converted many of its former opponents into hearty supporters. Moreover, as we have pointed out elsewhere, many of those who still hold the view that summer time may be prejudicial to their own interests admit that the general public advantages arising from it more than outweigh any inconveniences that may be caused in particular cases. In a few years we believe that what opposition still remains to summer time will have completely disappeared and that the whole nation will regard it as a wholly beneficent measure.

We recommend, therefore, that summer time should be reintroduced in 1917 and in subsequent years.

85. The suggestions which we have received as to the respective dates on which summer time should begin and end have been of a varied character, but the general view appears to be that the period of its application should be approximately from the beginning of April to the end of September.

In arriving at a conclusion on this matter many considerations have to be borne in mind. An early date of commencement would be of great advantage to those who devote their leisure hours to the cultivation of allotments, gardens or plots, on which a great deal of work has to be done in the early spring. On the other hand, a very early beginning and a very late ending for "summer time" must prove irksome to a large section of the industrial population of the country who have to start work in the early hours of the morning. We may refer to our remarks in this connection in paragraphs 27 to 30 above. We have considered a number of possible alternatives, and it has not been easy to arrive at a solution which would meet the views of all. However, after carefully weighing the above-mentioned and other relevant considerations, and particularly bearing in mind the views expressed from Ireland (with which we deal in paragraphs 90 to 98 below), we have decided to recommend that summer time should begin on the second Sunday in April and end with the third Sunday in September in each year.

86. It is obvious that the week end is the most convenient time for the change: and it has further been represented to us that advantage would be gained by making Sunday (which is, for the greater part of the population, a holiday) the last as well as the first day of summer time. We entirely agree with this view, and we therefore recommend that the change from normal to summer time should be made during the night of Saturday-Sunday, as last year, but that the reversion to normal time should take place during the night of Sunday-Monday. We have no reason to believe that any inconvenience will be caused by the latter proposal.

87. As to the extent of the variation from normal time, we have received only a very few suggestions for any departure from the plan adopted last year, viz, a variation of one hour throughout the whole period, which has the paramount advantage of complete simplicity. Any system of graded variations introduces an element of complication and would be bound, we think, to lead to inconvenience and confusion. We are also convinced that the adoption of a greater variation than one hour, over the period during which we have recommended that summer time should be operative, would be unsuitable for this country.

We therefore recommend that during the summer time period the variation from normal time should be one hour.

88. The following, then, is a summary of our recommendations:

1. That summer time should be renewed in 1917 and in subsequent years.
2. That the period of the operation of summer time should be from the second Sunday in April to the third Sunday in September in each year.
3. That the change from normal to summer time should be made on the night of Saturday-Sunday and the reversion to normal time on the night of Sunday-Monday.
4. That the variation from normal time should be one hour throughout the whole period.

89. We would further call attention to certain suggestions which we have made in regard to the questions of children's sleep and the closing of shops in paragraphs 36 and 64 respectively of our report.

We have recorded our opinion in paragraph 82 above as to the desirability of uniformity in time between the United Kingdom and those European countries observing the Greenwich meridian (particularly France), and we would express the hope that it may prove possible, if not now, at any rate in future years, to coordinate their systems of summer time without any serious inconvenience to any one of them, and thus secure uniform hours throughout the year in the time zone.

IRELAND.

90. We have already stated that in view of the somewhat conflicting nature of the evidence which we have received from Irish interests, and also in other grounds, we have thought it best to deal with the case of Ireland separately from the main body of our report.

91. As has been mentioned above, inquiries were issued to the county, county borough, urban and rural district councils, to the police, to the county committees of agriculture and technical instruction, and to a number of trade unions; while the views of the office of national education were obtained as to the question of children's welfare. In addition we had the advantage of discussing the position with some representatives of Irish interests from different parts of the country.

92. We found that Irish opinion is divided on the question of summer time, on lines that were perhaps to be expected.

93. *Opinions of town dwellers.*—It is clear from the evidence that the benefits of the act were thoroughly appreciated and enjoyed by the very large majority of town dwellers in Ireland, as in the rest of the United Kingdom, and in particular by those engaged in trade, business, or industry, both employers and workers. In view of all that has been said in the main body of our report as to the advantages derived from the extra hour's daylight we do not feel that we need elaborate the point further.

94. *Agricultural opinion.*—On the other hand it is also clear that, while farmers are by no means unanimous on the question, the bulk of agricultural opinion is unfavorable to summer time. We hear a good deal in the replies of the same difficulties, particularly in regard to haymaking and harvest, and also in regard to dairy work, which were generally urged by agriculturists before summer time was introduced, but which in Great Britain, as we have seen, were surmounted for the most part without serious trouble. In many districts in Ireland the farming community appear to have kept to old time by the clock; in other cases the hours of labor were shifted, as was largely done during certain parts of the summer time period in Great Britain. Elsewhere, complaints are made of the loss of an hour (some say the most valuable hour) at the end of the day.

It is not easy to see, at first sight, why so much more inconveniences should have been experienced by farmers in Ireland than in the rest of the United Kingdom, though it was pointed out to us that particularly heavy dews are experienced in that country in the early mornings; and some part of the explanation would also seem to lie in a circumstance which is mentioned in a number of the replies, viz, difficulty in getting laborers to consent to changes in the working hours; in particular they seem to have objected to working after 6 o'clock in the evening.

So far as we are aware this latter difficulty has not appeared to any appreciable extent outside Ireland, and we certainly do not think it should be regarded as insuperable.

95. *Children.*—In one or two of the replies from rural districts it is stated that summer time is attended with hardships for children who have any distance to go to school, though this point is not alluded to by the office of national education. The latter, however, mention that the sleeping hours of the children appear to have been shortened before people became fully accustomed to the change. The extent to which the tendency was apparent is not indicated, but it may perhaps be safely assumed that

the facts are not very different from those which we have recorded in the case of Great Britain (see pars. 32 to 36 above).

96. *The question of renewal.*—When the question is considered whether summer time is to be applied to Ireland for the future, it must of course be borne in mind that since October last the time in Ireland has been permanently advanced by 25 minutes owing to the substitution of Greenwich for Dublin time by the time (Ireland) act, 1916; so that in the event of summer time being applied to Ireland in the same way as we have recommended above for the rest of the United Kingdom, the advance would be 25 minutes in excess of what was experienced last year.

This consideration is very much in the minds of those who are not favorably disposed toward the renewal of summer time in Ireland; in fact, it would seem to be in many cases the principal ground of opposition.

97. We think, however, that its significance can easily be exaggerated.

It may be noticed, in the first place, that so far as "summer time" is concerned Dublin and the east of Ireland are only a few minutes ahead of the west of England, Wales, and Scotland.

Moreover, there would be more ground for apprehension if it were proposed to begin summer time very early in the spring or to continue it late into the autumn. In point of fact, as has been seen, we have recommended largely with Ireland in view that summer time should end on the third Sunday in September—i. e., at the latest on the 21st of September—instead of on the 30th, as was the case last year; and that it should begin on the second Sunday in April—i. e., between the 8th and 14th of April, inclusive, when the days are no shorter than at the beginning of September.

98. It has been suggested by some that, as a compromise, the variation from normal time should in the case of Great Britain and Ireland be half an hour or thereabouts; by others that this variation should apply in the case of Ireland only.

As to the first proposal, we are convinced that it would not be supported in Great Britain; while the second, in that it would involve difference from time in Great Britain during the summer-time period, would be a step back from the reform effected by the time (Ireland) act, 1916, which we are informed is of great value to the commercial interests of Ireland.

If summer time is to be applied to Ireland at all, as we unanimously think it should be, it must be applied in its entirety.

99. It would be quite impossible for us to acknowledge in detail the very great assistance which we have received from the numerous departments, organizations, and individuals whom we have consulted in the course of our inquiry, and of whom a great number devoted considerable time and trouble to obtaining for us the information for which we asked. We aimed at securing a large mass of representative evidence from every interest in the country, and we have succeeded considerably beyond our expectations. Without the cordial cooperation of all concerned these results could not have been attained.

100. In presenting our report we wish to record our high appreciation of the work of the joint secretaries, on whom has fallen an unusually large proportion of the labor of the inquiry, its organization, and the tabulation of the replies, owing to the procedure adopted.

We are, sir, your obedient servants,

J. W. WILSON.
JOSEPH DAVIES.
MALCOLM DELEVIGNE.
CHARLES DUNCAN.
JOHN B. LONSDALE.
T. M. MORTON.
WALTER NUGENT.
ANDREW H. PETTIGREW.
BEATRICE M. SAMUEL.
BEVILLE STANIER.

T. HUWS DAVIES,
M. H. WHITELEGGE,
Joint Secretaries.

FEBRUARY 22, 1917.

The CHAIRMAN. I think this is all that is to come before the committee at this time, so we will now adjourn.

(Thereupon the committee adjourned subject to the call of the chairman.)

MSH 22103

END OF
TITLE